LIBRARY
OF THE
UNIVERSITY
OF ILLINOIS
630.6
NF
1882/83-1890/91

# Proceedings

of the

# New York Farmers

LIBRARY

1882 to 1891.

PRINT
GLOBE STATIONERY AND PRINTING CO.
89 LIBERTY STREET,
NEW YORK.

630.6
NF
1882/83-1890/91

# MEMBERS, 1891.

—:o:—

Mr. Daniel F. Appleton.
Mr. George F. Baker.
Mr. John S. Barnes.
Mr. Samuel Borrowe.
Mr. E. F. Bowditch.
Mr. Frederic Bronson.
Mr. George H. Brown.
Mr. James A. Burden.
Mr. LeGrand B. Cannon.
Prof. Charles F. Chandler.
Mr. Joseph H. Choate.
Mr. Smith Clift.
Mr. Samuel J. Colgate.
Mr. W. Bayard Cutting.
Mr. Alfred B. Darling.
Mr. Chauncey M. Depew.
Mr. Theodore A. Havemeyer.
Mr. Robert Hoe.
Mr. John I. Holly.
Mr. Adrian Iselin.
Mr. John Jay.
Mr. Charles Lanier.
Mr. James Lawrence.
Mr. Johnston Livingston.
Mr. Pierre Lorillard.
Mr. J. G. McCullough.
Mr. J. Pierpont Morgan.
Mr. Levi P. Morton.
Mr. Gilman S. Moulton.
Mr. James Otis.
Mr. George B. Post.
Mr. Percy R. Pyne.
Mr. Francis R. Rives.
Mr. Archibald Rogers.
Mr. F. Augustus Schermerhorn.
Mr. Samuel Sloan.
Mr. James Stillman.
Mr. Thomas Sturgis.
Mr. Rutherfurd Stuyvesant.
Mr. Walter L. Suydam.
Mr. Henry A. C. Taylor.
Mr. Jonathan Thorne.
Mr. Samuel Thorne.
Mr. Cornelius Vanderbilt.
Mr. William K. Vanderbilt.
Mr. Herbert Wadsworth.
Mr. W. Austin Wadsworth.
Mr. John Hobart Warren.
Mr. W. Seward Webb.
Mr. John D. Wing.

—:o:—

### COMMITTTEE ON NOMINATIONS FOR MEMBERSHIP.

Mr. LeGrand B. Cannon.
Mr. John D. Wing.
Mr. Frederic Bronson.

* * *

## OFFICERS.

President, - - - Mr. FRANCIS R. RIVES.
Vice-President, - - Mr. JOHN JAY.
Sec'y and Treas., - - Mr. WALTER L. SUYDAM.

Address of Sec'y and Treas., No. 43 East 22d Street, or Blue Point, L. I.

# Proceedings

of the

# New York Farmers

SEASON 1882—83.

# The “New York Farmers”

DINED together at Pinard's, No. 6 East 15th Street, on Monday, December 18th, 1882. Mr. James A. Burden presided, and at his right and left sat respectively the guests of the evening, Dr. J. R. Sturtevant of the New York Agricultural Experimental Station, and Mr. E. Burnett, of Framingham, Massachusetts.

As soon as the coffee had been served, the President, Mr. James A. Burden, in introducing Dr. Sturtevant, said: One of our humorous friends has suggested that this society should be known as the “Fifth Avenue Farmers,” and I have been asked if we have our turnip fields and our hay fields in our back yards. To such enquiring friends, I have said that if they were to pay our farming bills for a while, they would be induced to believe that our acres exceed our back yards (laughter). I believe we are quite as anxious as the most energetic of working farmers to show a good balance on the right side of our farming accounts; and when we do not succeed in this, I think our farmer neighbors, at any rate, profit by our experiments. We have selected for discussion this evening, with a view to improvement in our farm accounts, the question, “How is the Eastern Farmer to compete with the Western Farmer?” and we have with us to-night as one of our guests, Dr. Sturtevant, Director of the State Agricultural Experiment Station at Geneva, who, in answer to your invitation, has kindly consented to speak to us.

Dr. J. R. Sturtevant then said: Although not unused to public speaking, yet I must confess that to-night I feel somewhat embarassed, flanked on one side by one whom I regard as a soldier first in war, and as a citizen first in peace, and who is, as we have known for many years, first in the hearts of his countrymen; and on the other side, by a gentleman, whom, even as a boy, I corresponded with. And now, in the presence of these and of more recent friends, I am called upon to speak. But a post-prandial speech is a difficult feat to perform successfully in proportion to the goodness of the feast, and thus in order to meet the expected call, I have prepared in advance a few remarks founded upon the simples rather than the luxuries of living. As I look about the board and see the farmers all sitting above the salt I cannot but realize the changes that modern times have produced, and cannot but recognize the prizes that are in store for the pursuer of agriculture who brings to the soil a ripe intelligence and a recognition that the honor lies in the man, and it is the man that ennobles his work. For a lowly use

a.D.2966

any man will do. To plug up a hole in a dam, one man may be as good as another. For some uses we rate only by avoirdupois. For a work of high character, the man is to be sought for, and high intelligence is the criterion of fitness for the work. The farmer of the past was the lowly man, the rustic, the *pagus* man, the countryman, his use measured by his muscle. The ideal of the present farmer is the country gentleman, a man who directs muscle by his intellect and whom the close communion with nature has made a gentleman farmer, the man who brings refinement and education to the profitable working of the farm.

The day has passed, in this country at least, of contempt for the farmer—the grand conservator of public morals, and the balance wheel of our national engine; and many thanks are due to the amateur farmer and the dabbler in agricultural forms as well, for the services they have done in bringing respect to a class, who, in the beginning, required an extraneous force to drag them from the toils that tradition had woven. The scaffolding, however, is useful for furthering construction, and is out of place when the edifice is complete; how much more suited to our ideas of ethics, if the scaffoldings, after their invaluable service, might form part of the buildings they have aided to construct, that due honor might accrue and their service still be continuous!

The gentleman farmer, God bless him, is a public man. His body cannot contain his great soul, and a portion of his manhood must go forth to do proselyte work for those who have not as yet attained his standard, and whom he would educate away from the twilight of progress into the sun of prosperity. The gentleman farmer is not rated according to his wealth, but according to his nature. I have met many who work with their hands because unable to employ others, and I have met farmers whose bank accounts were large, and yet who would not come within our classification. The peasant, the yeoman, the amateur, the gentleman farmer, we have all among us, although the words are not used in our ordinary diction, and education is the magic power which can metempsychose the lower into the higher.

Glance over the board and see what the farmer has done for us. The service may be credited to others, but the viands must be credited to him. Glance about the board and see what sort of men have made it possible for the farmer to succeed in his mission of providing for the many wants of many men. Nourishment, the simple necessity of the wild man, as of the wild animal; nourishment and taste, the complex necessity which, twin-like, keeps pace with civilized progress. The stomach is the promoter of civilization; it defines and establishes the wants which force progress, and rewarding desire ultimately find fulfillment. You, who demand perfect butter, or tender and juicy meat, or well-flavored vegetables, are unconsciously adding to the agricultural capabilities of our country, and are asserting yourselves as arbiters of the farmers' destiny. The waves of demand and supply, ever seeking equilibrium, are as the waves of the sea coast, rushing furthest landward with the highest tides. You, and such as you, in your strife for the best, are the tides, the farmers are the waves, success is the shore against which you are advancing.

The public may be educated in various ways, and as members of the body-politic, we can ourselves be educated in our conscious or unconscious efforts to educate others. I stand before you as the representative of a public means for a public good; of an organized effort in the like direction as your individual efforts. As workers and thinkers in the same course, we deserve each other's sympathy, and I may especially ask for a greater share, as engaged in systematic effort, using scientific method, and traversing roads parallel with those by which other arts have reached approved success.

The New York Agricultural Experiment Station is not a local enterprise in any sense, except that it must have a home somewhere. Its work is essentially cosmopolite, although its applications are designed for our Empire State. Its means include the use of educated observers, scientific thinkers and a skilled chemist, and the field and stable find use not only in suggesting truths but furnishing opportunity for tests and verifications of the results of carefully schemed questioning of nature. We must succeed in accomplishing good;—we are succeeding, for earnest belief and legitimate hope are good watch-words. "Who comes there," says Nature; "friends," say we. "Advance friends and give the countersign." "True seekers after knowledge," and the arcana of mystery are unloosed.

For Nature ever faithful is
To such as trust her faithfulness.

I will say a few words on the special subject of the evening and I have done. Where we cultivate staple crops, we shall find that in some instances, in the presence of abounding nature and good markets, there is very little need of education; but when we come under circumstances of competition, we find that education tells and that the staple crops are not the ones upon which effort can best be directed. It is special farming—that class of farming where education is to help a man to get superiority of product—which is going to bring the Eastern farmer up and enable him to hold his place, as he does now, in advance of his Western competitor. This may seem a small thing, and yet, if you look over this country historically, you will find that the advance which has come to agriculture has come from education and that those farmers who have succeeded the best are those who have left the beaten track, who have studied their farm, their crops, and their market, and by adopting special processes, have produced specially fine products, thus improving their farm, themselves, and indeed their whole neighborhood. It is to such gentlemen as you that these farmers are indebted for their success. They cannot raise themselves; they require this outside help; and you gentlemen, have given, and are going to give them, I hope, still more of this extraneous force. (Applause).

After a brief discussion on the subject of ensilage, Mr. E. Burnett was introduced by the President and spoke as follows: Three or four days ago, it was not a little bird that whispered to me that I might be called upon to make a speech, but it came by "*wing*" (laughter) though it was *no chicken* (renewed laughter). It gives me certainly great pleasure to meet so many friends who are recognized in agriculture. I have taken a great interest in Jersey cattle during the last year, and if it would be of any interest to you, I can give you a description of the method in which I handle about 3 tons of milk a day with a centrifugal machine. I suppose I am at present the only one in this country who is using this machine to any extent in dairying. Three years ago this winter—in February 1879—Mr. Weston of Boston, who had invented in '68 a machine for separating fluids of different specific gravity—said to me, "this milk centrifugal machine in Germany is exciting a great deal of attention, and I believe they have stumbled over my patent of '68 ; are you willing to try some experiments ?" I said, "yes sir, I will place my dairy and myself at your disposal." From that, we began in 1879 to run about 400 lbs. of milk a day, and that has increased until now I am handling, entirely with the centrifugal machine, 6,000 lbs. a day ; and we have improved the baskets so much that now we handle the 6,000 lbs. in about five hours, whereas formerly it took us three hours to handle the 400 lbs. The basket is a small, steel basket, made of homogeneous steel. It will stand a pressure of 300 lbs to the square inch and has to be balanced to a nicety—indeed to the fractional part of an ounce. That revolves on a spindle at the rate of 2,000 revolutions a minute. The milk is let in from above.

We find by experiment that the temperature of the milk, just as it comes from the cow, produces the most rapid results ; and a gentleman who visited me in 1880 was very much surprised when one morning at a quarter to six we saw some cows milked, and at seven, that milk had been put through the centrifugal machine and was on my breakfast-table in the shape of butter. That shows the rapidity with which we can do the work if we are obliged to. After I began making butter with this machine, I found that it changed the quality of the butter a good deal. It seemed to throw out some of those essential oils which are found in butter, and which gives it its peculiar and very delicate flavor. It threw out indeed more or less of that "butter milk" taste that we get, and it gave me what I consider to-day simply as a "negatively good" butter. As to the cream taken off, we take 200 quarts of milk and in ten minutes we have a cream that will barely pour. You take a tumbler of it and it pours as slowly as molasses in cold weather. It takes from ten to twelve quarts, according to the quality of the milk, to make a quart of that cream. I base my selling price for the cream on the Boston market. I dispose of about 75 quarts of that cream every day in pint jars, and I get thirty-five cents a pint for it, or seventy cents a quart. I sell all I can make and could sell more too. Some people, it is true, complain that the cream is thick and that it is dearer than ordinary cream. But it only takes four quarts of milk to make a quart of the cream of the ordinary milkman, and if you reckon the price of milk at four cents or five cents a quart, you will see that he makes as much at twenty-five cents or thirty cents a quart as I do at seventy cents. The skim-milk though, has a value which you can get in no other way. In Boston, I am very happy to say, we have no skim-milk law. A good honest skim-milk to-day is better than two-thirds of the milk sold in New York as new milk. My skim-milk is sold at wholesale at two cents a quart—retail at three cents—and there are from ten to twenty of the best physicians in Boston who are prescribing that milk. Adults use it freely. James T. Fields, for a year before his death, drank two quarts of my skim-milk a day. It contains all the bone and muscle and blood that there is in milk without the adipose. The centrifugal machine certainly gets all the cream from the milk, for you can set the skim-milk and at the end of forty-eight hours, there is not enough cream to cover a cat's whiskers. The cream has a peculiar sweet flavor, without that slightly acid, acrid flavor that marks the Devonshire cream, or a clotted cream, or a cream such as you get off pans exposed to the air. It is of an entirely different character from any of these creams. It is never clotted or lumpy. But it is smooth ; it pours continuously, and is probably the purest cream that can be got by any method. I was in England last year at the Royal Exhibition at Derby, and a friend said to me "I am very anxious for you to see our machine run." A little dairy house had been established and was run exclusively to show the working of the Aylesbury Dairy Company. Two centrifugal machines were being operated, and there were some twelve or fifteen men who were making butter—churning and doing all the dairy work on the Fair Grounds—and it was the most attractive thing that was there. My friend said "we shut down at eleven o'clock ; the Prince of Wales will be here at half-past twelve, and we are going to give him a private exhibition ; if you come in at half past eleven, I will show you the working of this new machine which will supersede all others." I looked at the machine and said "I have been using that machine for six months."

Mr. Burnett, by means of a goblet, here minutely described the one slight difference between the machine he himself uses and the Danish machine used at Derby, and continued ; my friend was very much astonished and wanted to know what I thought of the machine and I said it was the best thing I had ever seen, and I had settled on it as the most successful basket I had tried, and I have had five of them. They got the machine up, and the Prince of Wales came and we had a most successful exhibition in spite of one or two little things. The machine was not quite properly balanced, and in running it at a high rate of speed, the least little bit out of true will make a house on a foundation of stone shake, and it is more or less dangerous. A firm in Philadelphia have now bought out Mr. Weston's 1868 patent, and have bought the right to manufacture the Danish machine in this country, and the new machine is called the Danish Weston machine. I have been on to Philadelphia to see it, but I do not consider it as good as my machine. Mr. Weston, who worked with me on this machine is a thorough mechanic and machinist, and has done more on sugar machines than any other man in this country. He has developed and patented and introduced a very simple method of running these machines at a very high rate of speed, and it is very much more convenient and I think very much better than the Danish method which the Philadelphia company now pursue.

The cream is taken from the machine and put into pint bottles and these bottles immersed in ice water or packed in cracked ice and sent to Boston in cases, holding sixteen pints to the case, and from there it is distributed by my wagon throughout certain parts of the city. The skim milk is run right into forty quart cans; it is put into large tanks and is shipped on the cars at night—refrigerator cars—and at Boston is taken at half-past two in the morning and at half-past ten, it is all sold and in the consumer's hands. So that my skim milk really reaches Boston in as good shape and fully as early—in less time really—than the ordinary new milk which is made by the farmers and shipped in cans. The butter is churned the next day. We let the cream ripen a little bit. I am rather an advocate of sweet cream, but I want a cream, that has had time to ripen and mature a little, and so, although it is perfectly sweet, there is a slight change in the flavor. It is probable that the acidity is gradually developed—very slowly developed. I churn on the next day and I think my butter has a little higher flavor. The butter, I confess, I am not satisfied with. It has not that sweet milky flavor which is so desirable and so much sought after by connoisseurs. The centrifugal machine, let me here add, throws out a very peculiar substance from the milk. As Dr. Sturtevant and some of my friends who have been to my stables will admit perhaps, my cows and my stables are neater than those of the average farmer. At the same time out of my own milk, after running that basket three or four hours, we will find on the inside shell, from one-sixteenth to one-fourth of an inch of the nastiest, greenest slime you ever saw. This substance contains a great deal of nitrogen. Dr. Sturtevant and myself made many examinations of it with the microscope. It has about twenty-five per cent. of nitrogen and it also contains small particles of the mammary glands, little bits of flesh—little tiny particles. But it is of the vilest and most stinking form and shape you ever saw ; it is perfectly fearful. Take a little of it off and scrape it into a bottle, and leave the bottle uncorked for three hours, and the odor is intense, and intensely disagreeable.

A member: What is the cost of that machine?

Mr. Burnett: The cost of the centrifugal machine to-day is about $500. That is the first cost. But you cannot put it into an ordinary cheap dairy building. You have got to have a stone foundation. My centrifugal machines rest on big blocks of granite, six feet square and twelve or fifteen—yes, eighteen—inches thick, and weighing three tons. I do not think it would be advisable to use a centrifugal machine unless you handle one or two tons of milk a day, and of course if you have that amount, it would be rather difficult to depend on any other power than steam.

A member: How does this butter keep?

Mr. Burnett: It keeps very well indeed. I have taken butter without any salt at all, and kept it in a cool room for six weeks. But the butter lost more or less of its flavor. It was like a white salve; indeed it had no flavor at all. But it was perfectly sweet and good, and I think Dr. Sturtevant in the experiments we made three years ago, proved that the melting point of that butter was two degrees higher than butter made on the ordinary process.

Mr. Cannon: Do we understand you to say that you distrust the excellence of butter made under this centrifugal process?

Mr. Burnett: I distrust its superfine excellence. I make a very good butter which commands fifty cents a pound at wholesale in winter and forty cents in summer. I make from 100 to 150 pounds a day. I have to compete with the Elgin and that class of butter. I do not think my butter is as high flavored as the Elgin butter. And here let me add that I have taken a deep interest in the subject of butter during the past ten years. I left college in 1871, and I think we have made more advance in butter-making and dairying during the last ten years than during the half century before that time. I was so fortunate as to start just about when the improvements began. You will find to-day in all the hotels in New York a better butter than Delmonico and all the best restaurants had ten years ago.

Mr. Burden: Theoretically, should not your butter be better than that made in the ordinary way?

Mr. Burnett: Theoretically, it should, with the exception that we throw out, I think, some of its flavors.

Mr. Burden: Do you allude to the animal matter that is thrown out?

Mr. Burnett; That has, I have no doubt, something to do with it. Professor Arnold said he thought the power that was exerted on every square inch of that milk was sufficient to drive the smell of an onion into the edge of the machine.

Mr. Otis: Is this skim-milk sold in Boston as skim-milk?

Mr. Burnett; Certainly; it is an understood thing that it is skim-milk, and you will find in certain sections of Boston the sign "Pure Deerfoot Farm skim-milk—3 cents a quart—at retail."

Mr. Otis: Is it not a possibility that your skim-milk may be foisted upon the public as pure milk?

Mr. Burnett: It is a possibility. I have made a study of the milk business, and within the last two years I have been to work and am now about ready to launch a new enterprise in the delivery of pure, straight, honest milk in my section of the country—something that cannot be tampered with. My patent is applied for, but I do not know yet whether it is granted, so I will not enter into details.

Mr. Cannon: While we are on this subject of butter, I will say that I received a letter a few days ago in regard to a process entirely opposed to that of Mr. Burnett. I refer to the vacuum process. My letter informs me that a test was made with the following result: 950 pounds of milk produced 256 pounds of cream, the residuum being 694 pounds. From that cream was made $39\frac{8}{4}$ pounds of butter, and 91 pounds of cheese were also made. I saw an experiment myself with a similar machine. 100 pounds of milk were put in, and they got from that 20 pounds of cream and from the cream $5\frac{3}{4}$ pounds of butter and $13\frac{1}{2}$ pounds of cheese. The test was begun in the morning and the butter and cheese turned out before night. In the vacuum process, they raise the temperature—in this particular case they raised it to 125 degrees.

Mr. Burnett: We do not lower the temperature.

Mr. Cannon: No, but your temperature is not over blood heat, which is about 101 or 102 degrees in the bovine family.

Mr. Burnett: I never saw milk over 98 degrees in a healthy cow. I will add that I never saw milk brought up to a temperature of 125 or 130 degrees that did not have a peculiar sweet, scalded flavor—a flavor that you could detect.

A member: With your centrifugal process, how much cream would you have with 1,000 pounds of milk, Mr. Burnett?

Mr. Burnett: Cream is no gauge. It is like an elastic band; you can stretch it.

Dr. C. F. Chandler then said: Mr. Burnett has referred to the fact that there is no skim milk law in Boston. I am peculiarly responsible for the fact that there is a skim milk law in New York. That law has stood the test of the courts and of the legislature and we propose to maintain it, if possible. Some fifteen or sixteen years ago, I was employed by the Health Department, of which I was the chemist, to investigate the milk sold in this city and after analysing hundreds of samples collected out of grocery stores and taken off the carts of the different milkmen, I found that they were in the habit of disposing of a milk that was about two-thirds milk and one-third of it minus more or less of the fat. At that time, it was not possible to accomplish anything, but by and by—in '73—I was placed in a position where I had the power to carry out my own views in this matter, and we began at once to regulate the sale of milk in the City of New York. We found that we had 200,000 children under five years of age whose chief diet was milk and that those children were dying at an enormous rate. Out of 100 deaths, fifty-two were children under five years of age. We considered the various influences which surrounded the lives of those children and which determined the fact whether they should pass the age of five years or not. We came to the conclusion that the most important element in the whole question was the character of the milk furnished to those children. We believed that nature in preparing milk has been guided by proper principles for the feeding of infants, and finding that all milk of all animals which are fed upon milk contains a certain percentage of fat, as well as of caseine and sugar and salts, we could never bring ourselves to the conclusion that the fat contained in milk is superfluous. We believe that milk is a model article of food for the infants of all animals that nurse. We immediately attacked this sale of fraudulent milk in the city. We appointed a number of inspectors, and we sought the best method of determining the quality of milk. We were at the outset very much embarassed. The peculiarities of the milk supply make it stand out as different from every other article of food. You can examine a sample of sugar and say at once whether it is genuine or adulterated, because sugar is a definite article. So with starch or flour—you can determine at once whether they are genuine or adulterated. But you cannot take a sample of milk and by any process that has ever been discovered, say categorically in most cases whether it is genuine milk or not, because no two cows give milk of the same nature. It becomes necessary in the case of milk therefore to establish an arbitrary standard. This cannot be the standard of the best milk, because we have no right to arrest a milkman for selling milk that is not equal to the best; nor can it be that of an average milk, because, to make a case, we have to swear that from an examination of the milk, we know that it is not genuine milk; and we are compelled therefore from the very nature of the case to take the poorest milk that any cow gives as our standard.

We send our inspectors out therefore with the definite understanding that if they find a milkman who is selling an article as good as that given by the poorest cow, they must pass it, although they may be morally satisfied that it is a quarter water and has one-third of the cream taken off it. We cannot discriminate between good milk that has been skimmed and poor milk in its natural condition. We found, adopting even this low standard, that an enormous amount of milk was sold in the City of New York far below the poorest milk that comes from any healthy cow. We have succeeded in our efforts in spite of the most strenuous opposition. The entire press has been against us and we have had no assistance except from chemists. We have called the best chemists from all parts of the country; from the Agricultural College of Massachusetts, from the University of Pennsylvania and from New Haven; and they have sustained our methods before the courts as perfectly reliable and scientific, and we have never been beaten in any trial, either before the bench in the Special Sessions, or before a jury in the General Sessions. The Associated Milkmen—for they formed a society—made up a pool and they hired the best lawyers and the most depraved chemists and they did everything they could to break up our system, but we have beaten them at every point. They have found that in no way could they get rid of the lactometer, which is the great thorn in their sides, because by its aid, we can make a thousand tests, whereas if we were compelled to make an analysis, we could not make fifty. We have satisfied every court before which we have had the opportunity to appear that the lactometer, properly used by an intelligent inspector, is a perfectly reliable instrument. We have sustained both the lactometer and our standard, and the last dodge in which the milkmen of New York undertook to take refuge was the skim-milk plan. After we had defeated them at every point they conceived a new idea. They said, "we will put up a sign, 'we deal in skim-milk,' and when the inspector comes and finds us selling an article which has had two-thirds of the cream taken off of it, we will tell him that is skim-milk which we sell at three cents a quart. But when the customer comes in—some little girl from a tenement house crowded with sick children, with wasted limbs and no strength to meet the diseases of childhood—we will sell that skim-milk at eight cents or ten cents a quart, and it will do as well as whole milk." We found that there was no market in New York for skim-milk. You could not a sell a thousand quarts of it a day under its own name, although our daily milk supply is 500,000 quarts.

If we permitted every dealer to keep skim-milk, that skim-milk would be sold in the place of whole milk to every customer, and it would be skim-milk only when our inspector happened to look upon it. We say therefore that when we have such an enormous death rate among infants in New York, it is absurd to insist that because there are a few persons who want skim-milk, the food of all our babies should be jeopardized and imperilled in order to enable them to gratify that whim. We insist upon it, for the protection of the 200,000 or 300,000 children of the city, that it is perfectly logical and legitimate to forbid the sale of an article, which, while there may be a very minute legitimate demand for it, would simply become a cloak for fraud and make it absolutely impossible to continue to exercise any control over the milk supply of New York city. We are perfectly aware that skim-milk contains a very great deal of nutritive material.

It contains three or four per cent. of albuminous matter, corresponding in composition with lean meat, three or four per cent. of sugar, and two-thirds of one per cent. of saline matter, and with a proper addition of other materials, it is a perfectly wholesome food. But it is not the food to bring babies up on.

Now, by carrying out this theory of ours, by regulating the sale of milk and at the same time by attending to numerous other conditions that affect the health of children, we have reduced that ratio of fifty-two deaths out of 100 of children under five years of age until to-day only forty-six deaths in 100 are of children under five and fifty-four are over that age. That represents a saving of 5,000 children's lives a year, and that has been accomplished by the efforts we have put forth in connection with the conditions that surround the development of children, and we believe that the milk supply is the most important of those conditions. If the law were modified to permit the unrestricted sale of skim-milk in New York, we should discharge our inspectors at once, because the milkmen would have perfect protection in selling a milk with only one per cent. or one-half per cent. or seven-one-hundredths of one per cent. of fat, which is not a food that nature intended babies to live on, though it might do perfectly well for the pie bakers to make pies of. It has been said that we interfere with the rights of the American citizen because pie bakers need skim-milk to make pies. While for my part, I do not think it meritorious to do anything to facilitate the development of the pie industry, we have simply answered that if the pie bakers choose, they can buy the milk and take the cream off it and put the skim-milk into the pies. At any rate, it won't hurt the pies to put the whole milk into them.

Mr. Burnett: I agree with the gentleman on almost every point. Let me add, however, that in Boston, every vessel that contains skim-milk, is required by law to have on it in letters one inch in length, a sign to notify the people what they are getting.

Prof. Chandler: That is the law in New Jersey and in order to evade it, the milkmen put "skim-milk" on every can. That is the way they get over that difficulty.

Mr. Burnett: I will say here also that two-thirds—yes, three-fourths—of the milk sold in New York, while it is not literally skim-milk, is milk that has been skimmed more or less and has lost a great deal of its cream. The amount of cream that is sold here, if you could gather the statistics of it, would astonish you. Where does that cream come from? It comes from the milk that comes into the city. Still, I think that skim-milk has a great deal of value as a food, and I would rather have a calf brought up on skim-milk, after it has been once started and is say two weeks old, than one brought up on whole milk. South Boston is my greatest market and Dr. Richardson and other physicians have told me that I have been doing a first rate thing in selling it. I started my own stores there. I have my own men, paying them by the week, and they distribute the skim-milk at two cents a quart, and they tell me it is better for the children than milk that will pass muster as whole milk and sells at five cents or six cents a quart, which is the price at which some new milk is sold in Boston. You know what milk at five cents a quart at retail must be.

Prof. Chandler: I have no doubt if we had persons like Mr. Burnett selling milk in New York, there would be no difficulty. Nor would there be, perhaps, if we had a license system, by which the milkmen were brought under control, and could be punished if they violated the law, by being deprived of their license. But our milk supply is largely in the hands of corner groceries, where they dispose of a single can—persons who cannot be relied upon at all. Then our conditions as to price are such that there is no need of allowing skim-milk to be sold. They only pay the farmer two cents or three cents a quart for whole milk, and they sell it at ten cents. If they got the skim-milk at half price, they would only be able to sell it at nine cents. The whole difference between skim-milk and whole milk is the difference of price at the farm, and if the dealers get the skim-milk for nothing, they would simply be enabled to sell it at seven and one-half cents a quart if they were paying two and one-half cents a quart for whole milk. The economical argument fails entirely when you remember that it costs as much to bring a can of skim-milk as of whole milk from the farm to the city, and equally as much to cart it about town. If they would sell skim-milk at three cents a quart, and sell it only as skim-milk, I should not object to it for a moment. But there is no profit in it unless they can sell it for whole milk; and under the circumstances, its sale in this city is necessarily surrounded with fraud.

Dr. Sturtevant: I had the pleasure of visiting Mr. Burnett's farm and seeing the centrifugal machine in operation and tasting the milk. The result of that satisfied me that there is a vast difference between skim-milk from the centrifugal machine, which is only a few hours old and skim-milk which is the residuum in the pan after twelve or fifteen hours.

Mr. Dinsmore next made a few humorous remarks, after which, in response to a question from Mr. Wing,

Dr. Sturtevant said: The milk of different cows has a different value. The milk of the Jersey cow is especially fitted for the purpose of making butter. It will make butter quicker and more economically than will the milk of the Ayrshire or the Holstein—the only other two breeds I have experimented with. While the milk of the Ayrshire may take half an hour to churn, the milk of the Jersey cow will churn in three or four minutes, and the quality of the butter is distinct and different. There is one peculiarity of Jersey milk. It makes a butter peculiarly fitted for early marketing. I know of no case in my experience where Jersey butter has been packed and yet kept its characteristic quality. It must be put upon the market soon after it is made, and if people are going to pack butter, it seems to me that the Jersey cow is not the cow for them. Better almost any other breed. Placing the butter of the Jersey and Ayrshire and Holstein breeds under similar conditions, I found that when the Jersey butter will be completely rancid, the Ayrshire butter will be off taste, and the Holstein butter in good condition, and when the Ayrshire butter becomes rancid, even then the Holstein butter may be in first class condition. This reminds us that a couple of centuries ago, the Dutch butter was famous for its quality of keeping and was always supplied to the navies of the world for sea going butter. That fact has been transmitted down to the present time. Each breed has its own peculiaritiy of butter which suits it for some one circumstance better than another.

Mr. Burden: All of the Jersey breeders who make butter, I have no doubt, have the same trouble that I find in making butter that will keep. I would like to know, though, if there is any royal road to making butter that will keep for any length of time?

Dr. Sturtevant: I can only give you impressions as to that and not facts. I believe the keeping quality of butter depends a good deal on the breed and on the food, but more on the breed than on the food. I have suggested to a friend to try boracic acid; I think the subject is well worth the attention of butter makers.

Mr. Burden: Do you think fermentation of the cream will assist the keeping of butter?

Dr. Sturtevant: No sir; there is no indication of its causing butter to keep longer. But it is more apt to give it a little finer flavor. I will say here also that I have seen Mr. Burnett make as good butter from the centrifugal machine as I have seen anywhere. That shows that to get good butter, it is only necessary to know how to manage the machine. Indeed, I am a little more enthusiastic over the centrifugal machine than even is Mr. Burnett.

Mr. Burden: I would like to ask Mr. Burnett if he can explain why it is that the Darlington butter always commands at least a dollar a pound, when other butters sold by our members sell at from fifty cents to sixty cents? I have visited the Darlington Farm several years ago and I found that they were setting their milk in open pans—the old way—and I tried their butter and I must say that it keeps better than any butter I can make on my farm.

Mr. Burnett: There is a great deal to be said on that subject. In the first place, the boys inherited from their father a secret in the doing up and manufacture of butter. That secret, I am told, consists in using a mere suspicion of saltpetre and a little sugar with their salt. The quality of their butter, though, is mainly due to eight quarts of corn meal a day per cow, and a third to a half of fine Chester County clover. That feed of clover and that corn meal in itself will give the highest flavor. It will make the acme of butter; there is nothing like it; and the time is coming when we have got to seek that. People are demanding nicer everything. The quality of everything has got to be raised and the price is no object. The Darlingtons run a herd of eighty cows. They buy every month from five to ten cows, or from three to ten. At the same time they sell, at the other end of the herd, the same number. They keep their number full but they never raise a cow. The moment a cow begins to fall off on her milk, and it does not pay to keep her for butter, she is only fit for the shambles, and she is sold to the butchers and another milch cow is bought to take her place. Their butter, however, is delicious; there is no doubt about that. When it comes from their dairy, it has a flavor that no other butter seems to have. A great deal of the flavor of butter is due, not only to the care in making the butter and the feed, but also to care and attention after the butter is made. Butter should be kept in a perfectly sweet vessel. I think a stone crock is the best thing in the world to keep butter in, but that stone crock should have a cover. The aroma of butter is taken up by the atmosphere and wafted into space. I do not care how delicious butter is—if it is set on the table for a day, it will lose all of its flavor. I have been a judge quite a number of times at our cattle show, and I know that butters examined on the first and the second days—the same butter—seem so different that you would think they came from different farms. You would never give a preminm to butter examined on the third day, even though you would award it a premium on the first. The time is coming when butter will be put up in hermetically sealed packages. I find I have more or less trouble with my family trade in butter through exposure. People put it it in a refrigerator with fish and cucumbers,—

Mr. Burden: And a pipe leading to the sewer,—

Mr. Burnett: And all sorts of things and then complain of the flavor.

Mr. Burden: But why does the Darlington butter keep better than that we are in the habit of making?

Mr. Burnett: The saltpetre, for one thing, is an antiseptic. Dr. Sturtevant has spoken of boracic acid. I have experimented last fall and this season with boracic acid, and I have kept my butter perfectly sweet, and have also succeeded, by means of boracic acid, in keeping the flavor wonderfully.

Mr. Otis: Mr. Burnett has alluded to the clover feed used by the Darlingtons. I have been told that they have a peculiar hay that grows with their clover.

Mr. Burnett: They have, from what I could see, a wonderfully sweet pasture land there—a land peculiarly adapted to the dairy interest, and while their cows are fed—still fed—every day in summer, yet when they do go out to grass for a few hours, they get a very sweet delicious pasture, that is peculiar to that section of the country.

A member: Do you know what the Darlingtons use in coloring their butter?

Mr. Burnett: I do not know for a certainty, but I am told they use carrots.

The "Farmers" then adjourned.

## The

# "New York Farmers"

DINED together for the second time during the season of '82–'83, at the Union League Club on the 15th of January, 1883. Mr. Jas. A. Burden presided, and the guests of the evening were Professor B. Silliman, of New Haven, and the Hon. George B. Loring, Commissioner of Agriculture. Nearly all the members were present.

As soon as coffee had been served, Mr. Burden briefly introduced Professor Silliman, who, he said, was especially well fitted to instruct the club upon the subject which had been selected as the theme of the evening—sorghum.

Professor Silliman then said: I might claim, perhaps in answer to the invitation of your president, that I am unprepared, from one point of view, to speak on this subject, because I certainly have not framed any particular form of speech that I should address to you to-night. But on another side of that question, I certainly cannot say that I have not devoted during the last year or more than a year a considerable portion of time and attention to the study of this very interesting subject. During that period—commencing, in point of fact, with the autumn of 1881—until a very recent date, there have been very few days in which my thoughts have not been concerned more or less in this direction by my pretty wide circle of correspondence over regions extending beyond the area of the United States and by the gathering together of information from all sources that were available to me, or those that were placed at the disposition of the committee of which I have the honor to be chairman, by the Hon. Commissioner of Agriculture whom I have the pleasure to see here to-night. We put, so to speak, a sort of drag net through the range of literature, and of correspondence, and of available information in different directions, and this committee—of which I see Dr. Chandler here present—has gathered together during this long period a pretty large amount of information—historical, statistical, agricultural, industrial, botanical and chemical, as the case might be—all bearing upon this very interesting subject. It is extremely to my regret that I do not see here to-night two others of our colleagues upon that committee, to whose labors we are very greatly indebted for contributions of great importance to this general subject. I allude especially to Professor Brewer, who has been in charge, as I dare say you are all aware, of the agricultural section of the investigation, and who, perhaps more than any other man in the United States, is competent to speak alike from the chemical, from the botanical, and from the agricultural and statistical side of this subject. I allude also to Professor Johnson, the head, as you all know, of the agricultural station of Connecticut, who has given this subject very particular attention on the chemical side. I regret extremely that urgent engagements—and I am sorry to say in the case of the latter gentleman, ill-health—prevent their presence here to-night. I am instructed by them to express to you all equally their thanks for the courtesy which has been extended to them by the invitation to be here to-night and also their extreme regret that circumstances beyond their control have compelled their absence.

It certainly is a fact of great interest in the history of that very remarkable plant, the sorghum, that so far as our investigations have gone—and for this, I rely chiefly upon the authority of Professor Brewer—that there is no other plant except sorghum which has been introduced in the agriculture of the United States since the War of the Revolution, that has had sufficient importance and prominence in an agricultural sense to be mentioned to-day in the census. Yet, while this fact of itself is very significant, it is equally true in such a review of this subject as we have made during the past year, that we are only beginning to open our eyes to the importance of a plant which for a time had passed into a sort of desuetude—had fallen as it were from grace, after having twenty-five years ago assumed a factitious and spasmodic interest in the eyes of agriculturists, which gradually died out—as it was also only recently that we opened our eyes to the recognition of the fact that this plant in its various forms and varieties, all of which are referable to sorghum—for by whatever other name it may have been named, it is all one and the same thing, Guinea corn and broom corn not excepted—has perhaps without exception a more antique history, a more venerable record, than almost, if not completely, any other plant, not excepting wheat or barley ; and that it goes back into the dimmest dawn of history. In investigating this subject, I had the pleasure not long since of conversing with Sir George Campbell, who for thirty years or more was Governor General of the Presidency of Bengal, and he informed me, greatly to my surprise, that more than three hundred millions of the subjects of India, if my memory serves me rightly, were subsisting upon sorghum, and not upon rice, as we have ignorantly supposed here. For when I put to Sir George a question as to the importance of rice as a human food, he said, " It is a very great mistake that you make in America, equally with people in England, in believing that rice is the one important element of human food in India. That is not at all the case; except for about forty millions of people along the borders of the sea and along the course of the rivers that empty into the Indian ocean, rice is unknown as a great cereal, and it is upon sorghum that the people and the laboring animals of that country mainly subsist." We have lately received, through the agency of the Agricultural Department, from those regions an interesting collection of data on this point, which are an important contribution to what we have known before. We have been in the habit of regarding sorghum as a Chinese plant, and we have gathered in the course of our observations some very interesting data from that quarter; and among the rest, we have introduced into our report—it is the prefatory article in the appendix which is to be supplemental to that report—a most interesting and charming narrative by that distinguished Chinese scholar, Dr. Williams,—for forty-five years resident in China, and more familiar with her history than perhaps any native Chinese,—giving an account of the history of this plant. It is a curious fact, which I dare say may be known to some of you, that when the United States sent to China in 1854 to investigate the subject of Chinese sugar cane, so-called, supposing that the Chinese had some mode of producing sugar from this plant that was unknown to us, it was discovered that the Chinese had never made sugar from it at all, that their only use of it was as a cereal. Dr. Williams tells us that in China, sorghum affords the materials for fences. In our investigations, we fell upon a very interesting memoir by Mr. Vilmorin—a name very well known to all of you as that of the great seedsman of France—who, in the Bon Jardinier for 1854, has given a very complete and thorough and exhaustive history of all that was known of this plant, up to that time. It is interesting, in reading that, to see how many of the results he obtained in observations upon a little farm which he cultivated near Paris, where I have had the pleasure of being his guest, anticipated those reached in the course of investigations under the Agricultural Department,—observations that had been completely ignored from the fact that in that record they had lain slumbering, and needed to be revived by a new investigation. These historical memories are of interest to us in regard to one of the plants which we may put into the very foremost ground as an element of agricultural wealth, not alone for sugar, though it is certainly of great value for that, but also as a food plant. For this plant possesses, as you will observe, in comparison with other sugar producing plants, the very remarkable property that while at its maturity, it produces a full crop of sugar, in not inconsiderable proportions and of commercial and industrial value as a profitable crop, it also produces a full crop of seed, which is itself perhaps, in its best estate, not worth less per acre than a corresponding area of Indian corn. So that you can have in such latitudes as Minnesota and Kansas and Nebraska a single crop which gives you a profitable result in sweets, and also a profitable result in seed fit for the food of animals especially, as has been proved by the careful labors of this year at the Agricultural Station under Professor Johnson, which show that cows fed upon sorghum produce within seven per cent. as much milk as those fed upon a full diet of the usual character. Therefore, we have in this remarkable plant a result which I believe is exceptional. We learn also this interesting fact from our Southern friends;—namely, that certain varieties of this plant have the power of perennial growth. They are like the sugar cane in that respect and it is not necessary to replant in order to obtain a crop. The second year, the crop springs from the rattoons of the old year with more vigor than the first. Furthermore, the plant has that development in the early spring—in February and in March—and in June they cut their first crop and make a full crop of sugar, and from the stubble springs a more vigorous second crop than the first, giving them a second product. It is to be remembered, gentlemen, that over a large portion of the interior area of this country, it is not so much a question of sugar as it is a question of molasses, that is of value. Multitudes of gentlemen have written to the committee on the subject to say that they have not taken much pains in the granulation of sugar, but that the syrup was worth from $50 to $75 a car load the moment it came from the kettles and why bother themselves to make sugar, when they could thus sell their whole crop? One gentleman from that comparatively northern and remote district in Nebraska, Salem, has written to the Committee that he has made—as he shows by a balance sheet which he says is carefully prepared and which forms a part of the report of the Committee—not less than $56 net profit to the acre. Certainly, that is a very promising and satisfactory result of an agricultural experiment. Many other instances of a like nature have come to our notice. There seems to have been a remarkable obtuseness of mind on the part of previous cultivators and the general public, in reference to this subject, in not recognizing the essential fact which has been abundantly demonstrated by the experiments of the Agricultural Department, that the period of greatest production for sugar in this plant is when the plant is at its maturity—when its sweet matters have reached maturity—and that it is ready to cut when the minimum of glucose remains after the conversion of the greater portion of it into saccharose or sugar. This fact is one of the greatest importance.

In the review of this subject, the Committee undertook to go over the whole ground as far as it lay before them to see what the condition of the art was—what our state of knowledge was before this investigation of the Agricultural Department was set on foot—and they found simply a state of chaotic confusion as to opinions on this subject. There was every possible shade of difference in judgment on the part of persons apparently equally competent to express an opinion, and, therefore, it remained conspicuously the duty of the Agricultural Department to solve a problem of such noble proportions as this for a country so large and so varied in its agricultural resources as our own, and to determine what there was that was true and what there was that was false that might be eliminated out of this mass of contradictory conclusions. I think, up to a certain point, that question has been most satisfactorily settled by the researches of the Department, but by no means is it true that all that is important to be solved has been solved. We do not yet know satisfactorily how to deprive this syrup of all color—how to produce the process called, technically by sugar boilers, defecation. Even in the Rio Grande experiments—a plantation about four mile's this side of Cape May in the lower portion of Jersey, from whence came the beautiful sample of sugar I now show you, which is a portion of some 300,000 or 400,000 pounds that were made there—a plantation which I have had the pleasure of visiting on three successive occasions during the season—there was always present a portion of color which had not been completely thrown down and it was not easy to tell exactly how to avoid that.

Every experimenter in this direction has found a difficulty in that respect. But I am happy to say that much of the tattle and nonsense which has been talked on this subject finds its complete solution in the fact that in nearly all those cases in which this complaint has been made against sorghum, the plant had been gathered before it was matured, and that whenever it was allowed to attain an adequate decree of maturity this feculency disappeared. But this is a very large subject and it is somewhat technical, and I see before me others who are perhaps quite as well able to speak on the subject as I am. But we have reached this satisfaction in the result of the observations of the past year—to know that exceeedingly great progress has been made since this subject was first taken up by the Committee. And allow me to say that the origin of this Committee, was at a request made by the Commissioner of Agriculture to the National Academy of Sciences, of which I have the honor to be a member, that they would appoint a committee to make an investigation upon this subject. I think that the first thought that was in the mind of his honor, the Commissioner, was especially in reference to certain scientific questions bearing on analysis, but as the progress of the investigation developed itself, it became conspicuous that it was perfectly impossible to reach any satisfactory results unless the Committee took into view as well the technical as the scientific portion of the subject, and I was greatly gratified to see from a letter which his honor the Commissioner addressed to the President of the Academy that he was greatly satisfied to learn that the Committee had undertaken to make the investigation a practical one, bearing as it did in so important a manner upon the great farming and commercial interests of the country, and the Committee were stimulated and encouraged by this expression of opinion on the part of the Commissioner to push their researches in this direction.

Prof. Silliman here exhibited a number of samples of sugar made from sorghum. He especially directed attention to one made by Mr. Scoville, a resident in a champagne locality in Illinois—to others from the Rio Grande farm, already alluded to, and to one made by Captain Blakely at St. Paul, Minn. He added: Captain Blakely has had the candor to say that his experiment in this matter has been commercially a failure, but the reason for the failure was to be found in the fact that the cane was grown by farmers who did not understand how to grow it, and was transported to the factory a considerable distance, and under circumstances not at all well calculated to result in the best product of sugar. For you must bear in mind, gentlemen, that the sorghum cane must be worked in the day in which it is cut. You cannot stack it and keep it over night or until the next day, or as has been the case sometimes, a week, and then expect to get sugar. You get then only molasses. The transformation of the saccharose into glucose begins almost instantly after it is cut, so that within twelve hours after it is cut it ought to be in the condition of sugar. Among the points yet remaining to be settled by further investigation—and there are many of them—there is hardly one more important than that which concerns the results of fertilization. It would seem as if this plant might be subject to the same laws in this respect as Indian corn, but that is not the fact so far as we can ascertain. It comes to our knowledge from Prof. Swinson, of Madison University, who is one of the most careful observers on this subject, that in a series of investigations this season he had submitted from the Agricultural station in Connecticut a variety of fertilizers to plots of equal dimensions, all sowed at the same time with the same kind of seed, and that after an entire record of these experiments had been kept in the most perfect manner, the result of these various fertilizers was really *nil.* This was indeed a surprising result. Whether superphosphates or mineral manures or barnyard manures, or whatever other sorts of fertilizer were used, the result was rather in favor of the crop that was not manured at all. Now, this is something that we cannot accept as a positive or final result, and we must have further investigation, which can be had nowhere else so well as at the hands of the Agricultural Department. There are great problems of this kind still remaining to be solved which are altogether within their control, which are not so well within the control of private individuals. In connection with this matter of fertilizing there appeared only yesterday in the New York *Sunday Tribune* a communication from Gen. Van Buren, our Consul General in Japan, in which it is stated that this plant had been for many centuries in culture in Japan, and the yield of sugar from it has been very large, and then Gen. Van Buren makes the remarkable statement which I must beg to have confirmed by investigations on the part of the Agricultural Department, that the crop is grown there, not from seed, but from cuttings which are planted in the month of September, and from every joint of the sorghum sprout young plants, and that they are taken off in the spring of the year and are set out as plants. In Louisiana we plant rattoons—that is a common custom there—but this is entirely a new point to me, and I think also to other members of the Committee. The young plants, Gen. Van Buren says, are set out in due order about fifteen inches asunder in each direction, and they are then fertilized with fish and ashes, and with the reliquiæ of other crops in previous years. They are thus carefully cultivated, and the cane is pressed though rollers of wood and stone.

Gentlemen, this is a very great industry, and the point of most importance is that there is no longer any doubt about the production of granulated sugar from sorghum. To doubt that would be the same as to doubt whether we can make light from hydrocarbon gas or obtain electric power from falling water. Where people have blundered in their efforts to make a practical result, it is simply a case of perverse stupidity. For more than twenty years this subject has lain in a state of desuetude only from the want of that intelligent scientific investigation which Dr. Collier has given to the subject in the Department of Agriculture, and without which we should still have been in a state of comparative ignorance.

Professor C. F. Chandler, having been invited to speak, then said: I feel hardly prepared to add anything to what Professor Silliman has said on this subject. I had the good fortune to be associated with him and the other members of the Committee in collecting and examining the evidence that was obtained, and I fully agree with him in realizing the importance of the sorghum as a future crop in this country. But I should much prefer, rather than speak myself, to hear and to have you hear from Dr. Loring, under whose direction to a large extent these investigations have been made and whose sources of information extend over such a wide area that they must be far more valuable than those at my disposal.

Commissioner Loring then said: Mr. President and Gentlemen: When

I entered upon my duties as Commissioner of Agriculture, the first question that came to my mind was what could be done to relieve the department of certain clouds that rested upon it, and of a certain odium that not only the agricultural but also the business community of this country had seen fit to lay upon it. I went in honestly, as every New England farmer does, honesty being the foundation of their business, and I endeavored in a fair and honest way to investigate every question that came before me. I had Artesian wells bored where there was no water and not likely to be any water, and I had a variety of investigations going on as to the question of raising tea and building up the surplus labor of this country to a level with the Chinese contortionists of tea leaves. I had many other things—and among them, this question of sorghum sugar, which certainly, as the gentlemen here know, was a good deal under discussion and somewhat under a cloud, when I undertook the task of investigating it. Now, the results of my investigations have been stated to you by Professor Silliman very candidly and very emphatically, and I congratulate myself and this country upon those results. Sorghum had been under a cloud—I think, as he says, unfairly—not because there was any personal antagonism against it, not because there was any feeling against it, but because, some how or other, the manner in which it had been presented to the community had been, to say the least, not fortunate. I congratulate myself that taking that question in hand under those circumstances, I have managed by appealing to the best science of this country to develop it in such a way that it is perfectly evident that the thirty-five or forty gentlemen at this table accept the conclusions. I did not certainly know that I was employing a set of gentlemen who would discover that sorghum made the best fencing stuff in the world ; nor had I the slightest idea that three hundred millions of people lived on sorghum. I had not the slightest conception of the extent of the industry. I knew that there had been for twenty-five years as diligent and enthusiastic and devoted and determined effort to show that sorghum in this country from Maine to Texas and from Dakota to Georgia was as good a sugar producing plant as sugar cane, and far better than sugar beets ever could be, or would be, or had been. I appeal to the gentlemen here present if I have not done good work so far (applause). I bored two wells that began to give water before they had run thirty-eight feet. The luck was on my side. There was not force enough to send the water into the air, but they found it. I have also discovered the best way to treat hog cholera, though I do not profess that I will reveal it just yet, and also the best way to introduce forests into the stripped regions of this country. And I have put this question of sorghum upon such a footing that every man at this table must realize the fact that it is one of those matters which appeal not only to the farmers but also to all the powerful scientists of the country to help it on. And when I tell you that the sugar cane in this country produced last year two hundred and seventy-three millions of pounds of sugar and more than fifteen millions of gallons of molasses or syrup, and that the sorghum pro duced only, so far as I have been able to learn from 2,500 circulars, issued in every county in this country, to competent reporters, 550,000 pounds of sugar—there may be a million, but the truth is between half a million and a million—and more than twelve millions of gallons of molasses, I think you will see that there is a first-rate chance of every hard-working, toiling, horny-handed, delving farmer at this table to go to work to make his fortune, by producing sorghum sugar. Now, I desire to say here seriously that I have always had a kindly feeling toward the industry. I have never had the slightest antagonism to it at all, nor did I know that it was to be lifted out of any antagonism except those I have alluded to as having come from its case having been badly presented—and if there is any physician here, he knows that a bad presentation at a birth is the worst thing that a a doctor can handle.

If I have lifted it up out of that, I have done my duty. And now, gentlemen, I am sure you will pardon me, if wearied as I am by dry discussions and debates upon agricultural questions, sitting as I do, hour after hour, in my Department, listening to appeals for place, and endeavoring to manage, as the Professor well knows, the most eccentric persons on earth in all the practical work of investigation,—you will pardon me if I wander away for a moment and converse with you as practical, theoretical, enthusiastic, sensible American farmers a little while with regard to the status that you hold as land holders in this country. I would not undertake to tell you the precise value of Jersey cattle—you who sell Jerseys for $4,500 or $5,000 before they are born, while I cannot get more than $50 for my Ayrshires that I imported twenty-five years ago. Nor will I discuss the management of great estates ; and far be it from me to tell anyone at this table how to raise a crop of winter roses to perfection ; nor will I attempt to tell you how best to convert the great corn crops of this country into the various articles into which they are now converted. I will not discuss how these things are done, because you know it all better than I do, and if anyone of you should appear in my Department, I should sit down to my table—not to teach, but to learn. But passing away from such technical questions as these, let me remind you of the position which you hold as the pioneers of all the great agricultural industries—those industries upon which you not only spend your fortunes secured in other spheres, but also the hard study of your private hours. As pioneers, I think you will agree with me that there is no step in farming that does not cost. It is just as it is in every thing else—it is the first step that costs. You cannot start without having some capital behind you. You cannot name an enterprise that has been brought in here of which that is not true,—except perhaps that enterprise of getting corn which the Pilgrims pursued on the sands of Cape Cod when they dug out what the Indians had buried and converted it to their own purposes. The introduction of the Jerseys and the shorthorns cost ; the introduction of sorghum costs ; and the introduction of the American horse—the best horse in the world—costs. Now, the gentlemen who are gathered around this table really represent, fundamentally, that system of land holding which is unknown anywhere else on the surface of the civilized world exactly as it is known here. There is a system of small land holding in France, but there are no social or civil privileges that go with it. Napoleon in his Code divided the lands of France, as De Tocqueville well knew when he came here and said that the power of this Republic consisted in the fact that we had divisions and sub-divisions of land here. That Code divided the lands, but it did not give any man a chance to run for Congress, or the opportunity to get into a caucus and be nominated and come out with a small majority against him. When our fathers landed here, they left the feudal tenure of land behind them and adopted what is known now in the law as the commercial tenure, under which every man can convey real property to his neighbor as easily as boys swop jack knives in a town school. Now, that system which is so admirable here, and which you do really represent, however large your estates may be and however much you may expend upon them, is what every civilized nation on earth is now struggling to attain. Mr. Gladstone and John Bright, more than fifteen years ago, promised the Irish people, when they disestablished the Church, that they should have what they called the American system of land holding. But they have not got it yet. They have got riots and murders and outrages, but they have got no peaceful division and sub-division of the lands as we have here. When the attempt was made to give it to them, the whole power of the land holders of England rose against it so irresistibly that the thing could not be accomplished. Peaceably and quietly, our fathers here established for the first time in the history of the world a system of record of deeds which fixed for us this simple theory of land holding which makes us what we are—a theory which if it were more extensively applied would, I think, solve many social questions. Give to the Irishman lands—how many riots will you have? Give to the Indians farms and how many Indian Commissioners will you need to send out with rum and rifles?

The division of lands, according to our system, is the great solvent of all social and civil evils. Lord Derby, eight or ten years ago, at an Agricultural Fair in Manchester, said that the farmers of England were well enough off, and so too were the land holders—that they had got 30,000 land holders, and that was a great sub-division of the lands in England. Lord Derby forgot that these 30,000 were out of 35,000,000 of population in the United Kingdom. Had he come here to New York and dined with this club, any man here could have told him that out of 50,000,000 of people in the United States, there are 12,000,000 land holders; while in the State of Massachusetts, out of one and three-quarter millions of people we have 50,000 farmers, and no less than 300,000 land holders of all kinds. It is very difficult indeed to keep the most industrious men in the Massachusetts mills; if they have made a little money, they buy a farm and raise onions and potatoes and turnips. This division of the land began in the very outset. I cannot tell where the gentlemen around this table sprang from. I do not know who their forefathers were, but somehow or other they have an old fashioned, colonial English cut about them. Here and there, there is a little Dutch blood coming in, but as a general thing they have that old powerful style which carried our country through its early struggles—and which made so many names illustrious—among the rest that of John Jay, who held so honorable a place that my old ancestor always drank at the close of his dinners, in order that he might stop the wine drinking at his table, this toast, "Gentlemen, I give you John Jay." How extraordinary it is that no man in New York or in Massachusetts in the old colonial days, who had made his fortune in trade or on the sea, thought he was repectable until he had a farm! Their farms were scattered all up and down, and I look with most intense pleasure and the most entire satisfaction upon the tendency of New York gentlemen, after they have made, or even while they are making their fortunes in the great avenues of trade in this great commercial emporium, to found great landed estates and cultivate them in the interior of this commonweath. It is one that I have often alluded to in my appeals to the same class of gentlemen in Boston, always, however, repining with them that the lands we possess in the interior of our State can in no way compare with those tempting lands along the Hudson and the Mohawk. When I was practicing medicine after I had got my degree, I was associated with one of the most sensible and practical and substantial old New England physicians I could find, and he took me round with him on his professional journeys. We rode over the hills and through the vales of eastern Massachusetts, and as we went along he always kept his eye on the land. If there was a fine hill pasture, just in the middle of June, when the grass was in full growth and on it were grazing a fine herd of great broad-horned oxen—we did not think an ox worth a cent then unless it had broad horns—he would turn to me and say, with an air of quiet pleasure, "those are my oxen and my pasture." Come to a hillside, clothed with forest, it was his hillside. I learned to set an ox to a pound and measure him to an inch under the instructions of my old medical instructor. He knew that sort of things better even than he did pills, and at last, I said to him, "How is it you have such a love for farming—why do you own so many lands?" He replied, "these men when they get old, die, and when the estate is settled, I would just as soon have land as money." With such an instructor, it is not wonderful that after pursuing this occupation seven or eight years, I thought I had done enough in that line, and abandoned it for the more profitable business of farming and breeding Ayrshires, and sending milk to the market. In my early life, I had a great deal to do with the old clergy—knew them well. They were a stalwart set of men. They had a faith and though they were not evolutionists or transcendentalists, they could square a man's course as straight as the railroad from here to Washington, and tell him how to get to heaven. But they were not only good theologians but also good farmers. If you had gone into the country on Saturday afternoon at those times, you would have found them not in their studies but in the field, with faces as brown as yours are, engaged in the practical business of farming. They were devoted to the land and they toiled hard and they preached as they toiled, and they sent out into the country strong men—the great chief justices, the Parsons', the Lowells', the Storys', the Jacksons', as well as the great merchants that made Massachusetts and helped to make New York what they are. Such were the land holding clergy of New England—settled on $400 a year and a farm. They educated their boys in college, and they laid up money out of their salaries, and I know one who went on in this way for fifty years and died worth a good farm, and he had educated four boys in Harvard College, and he left them $15,000 or $20,000 to live on after he was gone and that was a great fortune in those days. And so with the lawyers—like the doctors and the clergymen, they had a great deal to do with the land. Why, in my time, if they carried a man through a long case in court, and the man had a wood lot, the lawyer would have that wood lot before he got half through the case. This curious taste for land holding is very striking, and it ought not to be forgotten. It is not a matter for mere jest, it is a matter for serious attention; and the position in which you have placed yourselves as the pioneers in this business is one which is entitled to most respectful consideration, whether it be round the festive board or in the deliberations that are continually taking place in this country upon these great fundamental questions. This is eminently a proper place for Professor Silliman to bring his conclusions and these are the men who can carry those conclusions which he has reached in the laboratory to a practical test. These are the men who can tell us what great agricultural experiments—the introduction of new machinery or of new crops—will come to in the development of this astounding industry that every year produces $9,000,000,000 worth of products, of which the American people, with their powerful appetites and their desire to clothe themselves well, consume all but one-tenth. I want to say to you that you have an opportunity which you have really improved to make the agriculture of this country first and foremost of all the agricultural industries of all the nations of the civilized world. There is no discussion in Congress, as there is in the British Parliament as to what shall be done with the farmer. The American farmer with his lands can take care of himself, and does not ask any laws from Congress to help him out. Dr. Loring closed by expressing a hope that Congress would provide for the representation of their country at the coming exhibition of animals at Hamburg and that the New York Farmers would lend their assistance to make that representation as creditable as possible.

Mr. Havemeyer, having been asked to give his practical experience of sorghum, said: As to sorghum, I really know very little about it. There is no doubt that it is a sugar plant; the difficulty with it, so far as my investigations have led, is in the production of sugar from it—that is, in grinding it, and in extracting the juice from it. I think that question is at present an unsolved problem, though when it is solved, sorghum may be a very good crop. I hardly think it can be called so now. So far as its value for cattle food goes, I have heard a variety of opinions. Some say it is good and some say it is very poor. That is as much as I know about sorghum. It is entirely out of my line. I am devoted entirely to cane sugar, though I have bought a good deal of sorghum sugar and have refined it.

Professor Silliman then said: You will allow me to offer an opinion which may be seemingly in contradiction to that of Mr. Havemeyer. The last year has solved the question how to extract the juice. There is no more difficulty about that than there is in extracting the juice from sugar cane; and we chemists do not not recognize any distinction between the product of the juice and that of the sugar cane. The results of the researches of the Department of Agriculture show conclusively that weight for weight, there is quite as much saccharose in the juice of sorghum as in the juice of the sugar cane. It averages fourteen or fifteen per cent. and that is all that sugar cane in Louisiana does. The machinery used in extraction is absolutely the same as with the sugar cane, and the character of what is left behind in the begasse or refuse is just the same. There are different modes of treatment. One establishment, for instance, uses a double set of mills and passes the begasse a second time, after having worked it with a little water, which is a mode of extracting a considerable quantity of sugar. As the Commissioner knows, one of the great problems that remain to be solved is how to save out of the begasse that which is now wasted in it. The result of the pressing, whether in Cuba, or Louisiana, or Minnesota, shows about the same thing—a loss of thirty or forty per cent. in the begasse. That can be saved in part by a second rolling and in part by a method of displacement. But the difficulty is one of the past; there is absolutely no difficulty remaining in that direction. It is simply a question of mechanics and not of chemistry, and there has been no mistake made whatever this year in any of the larger establishments, like that of the Rio Grande, or that at Springfield, or in other parts of the West in producing granulated sugar. The question is one merely of relative production. This year has been a most prosperous and successful year in cane sugar in Louisiana. I have received letters within a few days, from Louisiana, which state that in one neighborhood they have made as much as 6,000 pounds of crystallized sugar to the acre, which is an astonishing result. I believe that in Cuba such a result may not be exceptional, but in the ordinary course of the industry in Louisiana, 1,500 pounds or a hogshead and a half, is considered a very fair average crop.

Mr. Havemeyer: Do you know any facts as to the profits realized by the Rio Grande people?

Professor Silliman: No: I have not their balance sheet; I merely know that Mr. Parks, the President of the Company, has assured me that the Company were entirely satisfied with the commercial results of their work. They made in round numbers about 400,000 pounds of sugar to the 1,000 acres of ground cultivated, and beyond that, they made about 1,100 barrels of molasses, and they had seed to the extent of 15,000 or 20,000 bushels, which were worth from forty cents to fifty cents a bushel. That is about the summation of their results.

The "Farmers" then adjourned.

# The

# “New York Farmers”

AGAIN met at Delmonico’s on the evening of Monday, February 19th, 1883.

Coffee having been served, Mr. Burden, as President of the Society, said that the subject of dicussion for the evening would be butter, and Professor Chandler had kindly consented to open the debate.

Dr. Chandler spoke as follows: When I accepted your invitation to say something to-night, it was under the supposition that there would be no specialists here, and that it was desirable that some member of the Club should come forward and say something on the topic of the evening. I am delighted to find, however, that one of the most distinguished specialists on that subject is present, and I shall make my remarks very brief. In looking through my printed diagrams on this subject, I found two that I thought might interest you. The first shows the composition of milk, and what happens to its 100 parts when it goes through the dairy. Those columns of figures show the composition in 100 parts of each of those substances—whole milk, skim milk, cream, butter and butter milk. You see that milk contains four per cent. of fat, three and one-quarter per cent. of caseine, etc.,—the etc. referring to albumen and some other bodies of that class—four and one half per cent of sugar, three-fourths of one per cent. of salts and eighty-seven and one-half per cent. of water. The whole milk contains everything that the growing animal requires. The fat represents one class of compounds, rich in hydrogen and carbon and very poor in oxygen, and in order to indicate exactly the composition of fat, I present the second diagram. While beef fat or suet contains only three distinct kinds of fat—oleine, palmitine and stearine—it is a very curious fact, that the fat secreted by the cow in milk contains in addition to these three simple fats, certainly six others, and possibly there might be added yet two more which have been recently detected. How it is that the physiological process of milk making should develop from three kinds of fat, six or eight more kinds is a problem that perhaps Prof. Caldwell can answer. I believe he has recently studied the question of how the cow makes butter, but I have not seen anything in print which explains it. This first table was reprinted from the investigations of Baumhauer, the German chemist, and the analysis of course represents the milk of one particular cow. The 100 parts of milk furnished ten per cent. of cream and ninety per cent. of skim milk; and the cream, when churned, furnished four per cent. of butter out of the 100 parts of milk, and six per cent. of butter milk. The butter, you will notice, is not all fat—only eighty-five per cent. fat and $13\frac{67}{100}$ water. Butter, therefore, is an emulsion, the same as milk, but it is an emulsion in which the fat predominates, while in milk the water predominates. There is also in butter a percentage of caseine and sugar and salts, and it is to the presence of these that the rancidity of butter is due. My neighbor just now asked me a conundrum—why it was they could make good butter in winter in very deep pails with covers to raise the cream—and he said he believed there was only one person who had ever suggested a satisfactory answer. I racked my brain to find what could be the reason that this should be the only way in which good butter could be made in winter, and I could only suggest that that particular mode prevented the admisssion of the air, which has in it the germs of different fungi, which breed and produce putrefaction and souring. That probably is the real reason; at least, the other man thinks so too. Whether it is really so, I do not say; but that is the best guess I can make in answer to that question.

So, butter is an emulsion—a mixture of fat and water, with a certain amount of the other constituents. There is no one of these five materials which is free from anything contained in any one of the others. Evidently the cream is fat off the top of the milk, and it has thirty-five per cent. of fat instead of the four per cent. in milk, but it has its share also of all the other constituents. The butter is simply cream concentrated on the fatty side. It has eighty-five per cent. of the fat, but still it contains a proportion of everything else contained in the milk. One of my assistants has recently made some interesting photographs, which I thought might amuse the members of the Club and which I will pass round for examination. He has placed drops of milk in a microscope, and then he has pointed the microscope into the camera, and procured photographs. The first is of cow's milk magnified 420 times, in which the peculiar globules may be detected. The next is of cream, showing these globules to be much more numerous; and the next one is of skim milk, in which the fat is rather scarce. Then comes one of human milk, and then one of elephant's milk. Do not suppose that the greater size of the globules in the elephant's milk is due to the size of the animal. The fact is simply that they were enlarged 640 times, while the cow's milk was only magnified 420 times. The globules in the elephant's milk are really no larger than the globules of fat in the cow's milk. There has been a great dispute whether these fat globules are enclosed in membranes or not. Some investigators have insisted that they were contained in little sacks, in which the fat was held in suspension in the milk. I must confess that I have not kept myself posted on that subject, but the last time I had occasion to look it up, it seemed to be the impression of the most careful investigators that there were no membranes. Dr. Caldwell, who has studied the matter more recently, may be able to correct me and give us the latest decision. The only difference detected in examining different milks or different qualities of different breeds is that there is simply a little difference in the size of the fat globules, and a little difference in the number of them.

A member: Which one has the most?

Dr. Chandler: The Alderney milk is as rich as any that has been analyzed.

A member: Is it not richer?

Dr. Chandler: Perhaps it is richer; I had perhaps better admit that here. But it is a great mistake to suppose that the Alderney milk is only richer in fat. As a matter of fact, it is poorer in water, and it is richer in fat, richer in sugar, richer in caseine, and richer in salts. One of the first things said to me when I attempted to detect adulteration in milk was that Alderney milk would stand low on the lactometer, because it was rich in fat. I said at once, "that does not prove it at all; we will see." We examined some of the best cows, and we found the Alderney milk is the heaviest there is. It is heaviest because, while it contains the same constituents as other milk, it contains more of each one of them; and so, as ordinary-milk is heavier than water, Alderney milk is still heavier.

But I should regret very much to take up more of your time, when there is some one else here who is so much better posted on this subject. Dr. Caldwell and I began to study chemistry on the same day in the same place—the laboratory of Harvard College—on the 1st September, thirty years ago. We afterwards went to Germany and we studied together at the University of Gottingen. But Dr. Caldwell's life has been led in the sweet pastures and green fields of Cornell University, while mine has been wasted in tenement houses, abattoirs and Hunter's Point sludge acid factories. Consequently, when the evils of our surroundings are discussed, I may be able to throw some light upon them; but in regard to the unalloyed joys of country life, I much prefer to have you listen to him.

Professor G. C. Caldwell then said; When a chemist is asked to say something about butter before an assemblage of farmers, it is of course not expected that he shall talk about the manner of making it or of marketing it, but rather that he shall give something of the chemist's way of looking at it, who sees in it somewhat more than a lump of golden yellow fat, with a fragrant aroma and delicious taste. Moreover it may be the more prudent course for him to take in such an assemblage; agricultural chemists are often credited with very little practical knowledge of the matters of the farm; and some farmers do not pretend to know much about the chemistry of their calling; so if he keeps on ground that is familiar to him he will not show to his hearer what a helpless being he would be if turned loose with his vials of chemicals in a butter factory, to undertake its management; and if he does talk incorrect chemistry, *perhaps* he will not be found out, at least till he has had time to get out of reach. I shall take the safer course, and talk chemistry, and not be afraid.

To call a plate of gilt-edged butter a lump of fat, as I have just done, may seem to some disrespectful and even shocking; but still it is that and nothing more—own kin to beef tallow, lard, or cottonseed oil, although superior to them all, and distinguished from them all in an unmistakable manner. If we divide the people of the world who know butter into two great classes, chemists and those who are not chemists, we can safely say that neither class will fail to make this distinction correctly every time;

neither would ever take the best and cleanest of oleomargarine or suine for the poorest piece of genuine butter that was brought into this city to-day. But the chemist knows almost as little about the qualities by which the unchemical man would so unerringly pick out the genuine butter, as the non-chemist generally knows about the way in which the chemist would distinguish it; the inner reason of the aroma and the flavor of butter is almost as much of a mystery to the chemist as are to the average farmer the saponification, distillation of the soap with sulphuric acid, and titration of the distillate with standard alkali, by which the chemist would know butter even with all his senses but eyesight cut off from use. The aroma and the flavor he cannot measure and weigh; but there is something else, just as characteristic of butter as these are, that he can measure and weigh; permit me to explain what this is before I tell what little he knows about the other qualities which are really those that give the substance its value for the table.

The great mass of all fats, butter not excepted, is made up of three constituent fats, called oleine, palmitine and stearine; it was formerly held that there was another, intermediate in all its properties between stearine and palmitine which was called margarine, but which chemists, though with some difficulty, proved to be only a mixture of stearine and palmitine; though the substance exists not, the name sticks by us still in what the dairyman considers his worst enemy, oleomargarine; allowing that margarine is a mixture of stearine and palmitine, no truer name for the product so designated could be found; it tells just what it is, a mixture of oleine, stearine and palmitine. Now the fat in milk, which when collected together we call butter, contains a number of other fats, whose names I will not take the time to give; you will doubtless be satisfied if I say that these names all end in ine, and that the chief of these fats is butyrine, taking its name from butter.

When any one of these fats is made into a soap by boiling with potash or soda lye, and this soap is then heated with sulphuric or any other strong acid, glycerine and what is known as a fatty acid are the products obtained; each fatty acid thus obtained takes its name from the fat that yielded it, so that stearine gives stearic acid, butyrine butyric acid, etc.; now we have already reached the prime distinction between butter fat and all other fats, which the chemists generally make use of in their way of distinguishing the one fat from the others. Stearic, palmitic and oleic acids, the acids obtained from stearine, palmitine and oleine respectively, are insoluble in water; butyric acid, and its associates in butter, are soluble in water; and to tell whether what his grocer sells for butter is butter, or oleomargarine or any other fat produced in the wide world by plant or animal, the chemist has only to get the fatty acids out by themselves, and test their solubility; if they give up little or nothing to water then the grocer's reputation for honesty is gone; what he sold for butter could not possibly have been butter. Furthermore, and fortunately too for the interests of honest butter, butyric acid and its particular companions in butter possess another property which distinguishes them from stearic acid and its associates at the other end of the list; the former are volatile, while the latter are not; that is to say, when I put the soap of butyric acid, etc., in a retort, and add some strong acid the fatty acid is set free; and if I boil the mixture, the fatty acid will pass off as a vapor, which can be condensed by passing it through a cooled tube, and its quantity can be measured. If, therefore, a substance sold as butter gives me no measurable quantity of acid in the distillate when subjected to this treatment, then I know that it cannot possibly be butter, whatever assurances I may receive to the contrary. Further, by a large number of analyses of genuine butter the quantity of *soluble* fatty acids, or of *volatile* fatty acids that a certain quantity of such genuine butter yields, has been determined; and if a sample of supposed butter yields to the chemist only a third or half or two-thirds of the soluble or fatty acids that genuine butter always yields, then it is satisfactorily proved that the sample of butter under examination has been adulterated with some other natural fat. Let me take for illustration the measurement of the purity of butter by the quantity of volatile fats that it will yield; the German chemist, Reichert, who first published this method of testing butter proved to his satisfaction by the examination of a number of samples of pure butter, that the quantity of the volatile acids never fell below 12.5 measures in genuine cow's butter; I will not take the time to explain what this measure is, for it is not necessary to my purpose; it would be strange if there are not many here who are unfamiliar with the language of the chemical laboratory, and to such any further definition of the measure would add nothing to the force and plainness of my statement. Reichert, therefore, concluded that it was quite safe to say that if in any sample of butter examined the measure of the volatile acids was below twelve, the sample was adulterated. How far this conclusion can be safely applied will be seen presently; but for the detection of the substitution of genuine olemargarine butter for cow's butter, or for the mixture of any considerable proportion of oleomargarine or suine with genuine butter it gives a test which leaves no doubt in the chemist's mind. I used the method in my examinations of butter for the State Board of Health last winter; and when, after having gone carefully through all the preliminary operations of the method, with a sample of alleged butter of whose previous history I knew absolutely nothing except that it was purchased by the inspector of the Board in some New York grocery, I at length reached the final measurement of the volatile acids and obtained only one or two measures, as I did in a few cases, I had all the knowledge that I desired as to the previous history of the sample. If there were any doubt, I might say in passing, that cows butter was essentially the same thing the world over, such doubt would receive no support from my analyses; in several samples of butter known to be genuine, and in most of the samples examined for the Board of Health, also undoubtedly genuine, I found the same measure for volatile acids that has been found in Germany.

It is interesting to notice, however, that a recent investigator has unsettled somewhat the reliability of this measure; he found that it fell as low as ten in some samples of butter of undoubted genuineness that he had occasion to examine, and to determine whether this was a matter of locality or of season, he continued his examinations through a whole year, with the result that the measure evidently varied with the season, or in other words the proportion of butyrine and its associate characteristic fats of butter is different at different seasons; and that a butter which gives a measure of only eleven for volatile acids from August to October may be genuine, and of only ten from October to March may be genuine; but that for butter made from March to May if the measure falls below 12.1 it has been adulterated; or if made from May to August it must show a measure of 12.4 for volatile fatty acids, for a surety of genuineness. That this singular and not unimportant alteration in the composition of butter in passing from one part of the year to another is not a matter of the feeding, such as change from dry feed to green is evident, for the stall feeding is continued on into April or May. The explanation of the writer is, and it seems to be the most plausible one, that the change is due to the fact that most of the cows come into fresh milk in the spring of the year—so much so at any rate as to affect the character of the butter as a whole that is put upon the market—and that it is therefore simply a matter of the duration of the period of lactation, that the milk of the cow that has recently come in is richer in the characteristic fats of butter, and that butter fat is most unlike other fats at this period of lactation. The fact is an interesting one physiologically, and one too that the food chemist needs to consider.

This peculiar property of butter of which I have been speaking assumes still greater interest, when we consider that no other animal or vegetable fat possesses any such distinctive characteristic; give to a chemist a piece of lard, or mutton tallow or beef tallow, and he cannot tell you on the strength of any chemical examination which kind of animal produced it; and it would be much the same with a sample of vegetable oil, such as olive, cotton seed, ground nut, poppy seed or palm nut; of this I had personal experience also, last winter in my examinations of olive oil for the Board of Health; to be sure I did satisfy myself that a large number of the samples sent me were adulterated with cheaper oils, and I was pretty well satisged that the adulterant was in one case poppy oil, and in others cottonseed oil; but these conclusions were reached only by an accumulation of evidence furnished by several tests, neither one of which by itself would have been sufficient; and as for making any measurement of the amount of the adulterating oil added, even the most remote, it was quite out of the question. So difficult is it in fact, to safely distinguish one vegetable oil from another, that the Chamber of Commerce of Nice found sufficient reason therein, and in the importance of the trade in olive oil to the country, for offering in 1869 a prize of 15,000 francs for a simple, rapid and practical method of detecting adulterations of olive oil: and so far as I know, the prize has not yet been taken.

Therefore, in the whole range of vegetable and animal fats it appears that butter fat, the fat about whose identity people of good taste are more particular than they are as to any other fat, is the only one whose identity the chemist can establish beyond any doubt by methods of chemical analysis, and the only one whose quantity he can measure in a sample put into his hands, so as to tell whether the sample is all butter, or if not, about how much of it is butter; but if not all butter, and you ask him what kind of fat it is that is mixed with it, if he is as modest as a good chemist should be, he will confess that as yet he is not acquainted with any satisfactory chemical, microscopic or other laboratory method, by which he can get the information in answer to that question.

How unfortunate this distinctive quality of butter would seem to be for those who seek to improve it by toning it down by the addition of oleomargarine or suine! and yet they do not seem to fear it much, nor the absurd laws making it an offence to color oleomargarine to make it resemble butter. Supposing that a man is accused of selling as butter a sample claimed by the accuser to be oleomargarine, colored; the coloring matter used may be the same as that which is often used to color genuine butter; and how are the accusers going to prove that it was oleomargarine and not butter that was colored, without calling in the services of the chemist to prove the oleomargarine by chemical analysis; and having gone as far as this, which they must do in every case if the seller is sharp enough, why is the State law against the adulteration of food not sufficient for all purposes? But in spite of laws and chemists too, the adulteration goes on—more freely of course when genuine butter is scarce and high. In a monetary article on dairy products in one of the dailies of last November, it was stated that the butterine factories were buying a good deal of butter for mixing—that in consequence the price was kept up well, and that the butterine men will not be persecuted by dairymen while they afford a good market for the legitimate article; it is said in the same article that this butterine contains but thirty per cent. of genuine butter. The writer states also that dealers unite in saying that there is no practical test for the detection of butterine; if by a practical test is meant one that anybody can apply off-hand and finish in a few minutes the dealers may be right; so far as I have tried these tests, and there are a good many of them that have appeared in the newspapers and journals from time to time, a sample of butterine with thirty per cent. of butter in it would pretty easily escape detection by such methods; but a good chemist would find a *perfectly* practicable test in the method to which I alluded a little while ago. In Europe I suspect that this adulteration is carried on even much more largely than here; and Holland seems to be the centre from which the article is mostly sent out; there is a certain district or town in Holland by the name of Bosch, which, it is stated, was once famous for its fine butter: but not satisfied with the fair profits which such a reputation would always bring them, its people have taken so largely to adding oleomargarine to their butter, that butter from Bosch, or better stated, Bosch butter, came to mean in England adulterated butter; and a name never fitted better—hardly even that of the firm of the Brothers Stickwell that is so familiar to some of us on bottles of mucilage. But the reputation for adulterating butter is not confined to Bosch, and other parts of Holland are badly tainted; before the days of oleomargarine, other fraudulent practices are stated to have prevailed—such as the kneading of an extra proportion of water into the butter, or of using packages of a particular form that had acquired a reputation for carrying good butter for inferior qualities; and now the manufacture of oleomargarine butter is carried on on so large a scale, so says a recent German dairy paper, that in England the name Dutch butter is synonymous with oleomargarine butter. It is not a matter for surprise, perhaps, that an Englishman, and a vegetarian too, living in a country so near to this great source of supply of counterfeit butter, should seek to keep himself uncontaminated, by the use of a composition on his table for which he gives the following receipe: Take four ounces of the finest Brazilian nuts pounded very fine in a mortar; four ounces of pure olive oil; rub the whole into a smooth jelly; add eight ounces of wheat flour and a quarter of an ounce of salt; then rub the whole into a smooth paste and use for butter. How he would be sure of his pure olive oil, I cannot say; but being a vegetarian, doubtless he would not object to the cotton seed oil which he would be most likely to get.

I venture to say that this Brazilian nut, olive oil and wheat flour substitute for butter will not be very widely adopted, as long as the mass of people can get enough for their wants of what is called butter—looks like it and tastes like it and already made up for them, by sending to the nearest grocery—and that the mass of people will eat what they thus get and be satisfied, caring not whether it contains thirty, fifty or a hundred per cent. of oleomargarine or suine, so long as it is as agreeable to their palates as what they have always been accustomed to eat under that name, and perhaps in many cases a good deal better; and that this will go on till their tastes become educated to something better, or till Boards of Health, backed up by efficient laws against selling articles of food for what they are not, shall make men sell things under their own names; and when that is accomplished, the poor may if he chooses use butterine, paying for it what it is fairly worth and getting an article better than the bad butter for which he might have to pay a higher price were it not for the competition presented by oleomargarine.

But as for us, accustomed to the butter from our own high-bred cows of foreign extraction, or right from the green pastures of the country, where we live, we need no chemist to help us to see the gilt edge, or to miss it if wanting; there is a color, an aroma, a flavor and a grain, that can come out of no oleomargarine churn, and that no chemist can weigh and measure. I have but little time left, without wearying your patience, to speak about these qualities; but it is well enough that I have not; for there is little to say about them except that they are good. The cause of so simple a matter as the color, even, is a mystery still. Fleischmann, the best authority on matters pertaining to the dairy, in the course of numerous trials of a German apparatus for testing the actual butter-producing quality of different samples of milk, observed quite noticeable differences in the color of the butter of different cows that were fed side by side on precisely the same rations; and to him the conclusion was plain that the color of the butter is not due so much to the fodder as to the individuality of the animal. Aromas and flavors are due in general to what chemist call essential oils, or volatile fatty substances; but no chemist has ever yet got out of the butter its flavoring essence; and although he can now make to order the flavor of the apple, the pear, the strawberry or raspberry from substances that have had no more connection with these fruits than a strawberry has had with an apple tree, yet not to my knowledge has he ever yet prepared the smallest bottle of essence of butter; when he succeeds in that, then perhaps we who so glory in our appreciation of good, genuine butter, and look down with such commiseration on those who are as well satisfied with butterine, may have to give up our prestige; but till then we are safe from imposition. We are even not yet certain where to go for the primary origin of this aroma and flavor, for while one party affirms that it exists in the milk, another affirms that it is a product of the alteration of certain constituents of the milk, that takes place during the time that elapses before the cream is made into butter.

With some people it is almost a necessity that, if they wish to be sure of enjoying their dinner, they shall keep out of the kitchen and know as little as possible of the way in which it is made up. I hope that by this brief disquisition on some points in the composition of butter I shall not have in the least lessened the enjoyment with which you will partake of the fine product of your own dairies. I hope that I may rather have added to your sense of appreciation of good butter by showing that, while only a fat, it is yet markedly distinguished from all other fats, and may justly be assigned to a sort of a royal position among them—that as gold is by common consent the king of metals, so the golden yellow butter is king of fats.

Mr. Edward Burnett was next introduced by the president, and spoke as follows: Wankylin, the chemist, who was employed by the city of London to examine the milk used in the various workhouses and public institutions there, defines milk in a very simple sentence, as "a watery secretion of the mammary glands, holding in a fine state of subdivision small particles of fat." That fat is what we want to obtain to make our butter. Having milk, the first step is to separate the cream from the milk. That is done by two or three different methods. Those employed by the dairymen at large throughout the country are generally designated as the deep setting and the shallow setting. In deep setting, to obtain the quickest and the best results, the milk should be taken warm from the cow. If by any means or in transportation, this milk becomes cold, it should be heated, for it is the dropping of this temperature that makes rapid separation. A cubic foot of milk at 50° weighs more than a cubic foot of milk at 80°. Therefore, when we take warm milk and put it into a deep pail and plunge that pail into ice water, we lower the temperature very rapidly. The skim milk condenses more rapidly than the fat, and so it drops, drops, drops, and the fat is driven to the top, and in ten hours, or under some methods, even in four hours, we can obtain on a twenty inch pail, eight inches in diameter—the common Orange County pail—some six or seven inches of cream. That cream is not a pure cream. In its going up through the milk, particles of milk have adhered to it. The cream obtained by deep setting is a very thin cream and it contains a great deal more water than the cream from milk set in shallow pans. It takes two quarts of cream from deep setting to make a pound of butter. In shallow setting, the cream rises by the force of gravity alone, and the specific gravity of milk and of ordinary cream are so nearly alike that the process of separation is very slow indeed. Milk set in pans takes from twenty-four to thirty-six hours for the cream to rise, and the condition of the atmosphere has a great effect upon it. From personal experiments, I can say that just as much butter can be made by the one process as by the other, but it is acknowledged now throughout the country that deep setting involves less labor and less care and is less affected by the weather than shallow setting. Ninety per cent. of the butter that goes into market to-day is made from deep pails, and it is butter which will command the highest prices. For instance, the Elgin and the Stewart and the Wisconsin creameries, that have such a famous reputation in New York and get from forty cents to forty-five cents a pound all use deep vats or pails. These prices are from sales at the market value whereas the butter that brings the very highest prices here—butter with local reputation that is sold to families, such as the Darlington and the Ringwood—is made from cream that is most of it obtained in shallow pans. If the shallow setting is done carefully and the atmosphere in the dairy is held at a temperature of about 60°, you can make just as much and as good butter in that way as you can from the deep pails. I think the best temperature to put the warm milk into the ice water is at about 50°—not above that—and down to about 38°. The Dutch, or Schwarz system is simply a deep setting of milk, but instead of using round pails as we do they use a long oblong pail about six inches across in its widest part and something like an old fashioned tin wash boiler. They set their milk in much colder water than we do and obtain results fully as satisfactory. They try to get their milk down to 38° or 42°, while the ordinary creamery temperature is from 45° to 50°.

I may here touch upon the centrifugal method of separating the cream from the milk. We take the cream off by means of that machine in a very few minutes. The process is, as I told you before, one of forced gravitation. The pressure on the outside of a centrifugal basket is 250 lbs. to the square inch. The cream taken off is put inside and allowed to ripen in my dairy for about twelve hours. We get it off during one day and finish in the afternoon. Early the next morning that butter is churned and made up. By either one of these methods, we in this country generally demand a slightly acidulated cream—that is, a cream which has ripened. We ripen our cream at a temperature of from 58° to 62°, dependent upon the outside temperature. In winter we want to heat our cream up to about 62°; and in summer, even as low as 54° in dog weather is the best temperature to churn the cream and till ripening it. After using many churns, I have decided on the old fashioned barrel churn as the best. The most important instrument in a dairy is the thermometer. The reason why so many of the old country dairy women make uneven lots of butter is on account of there being so much guess work. If you will test your cream by the thermometer, there is no reason why one lot of butter should not be made equally good as another. The slightly acidulated or ripened cream having been placed in a barrel churn, it is churned from twenty-five to forty minutes. After that it is very apropos to ask you dairymen if the cream has broken yet. As I have understood it from treatises on butter making, the fat is encased in shells, which shells contain a great deal of the caseine, and when these globules of fat break and the butter is released from the shells, we gather it about the size of small peas or large shot. This we call butter in its granulated form. After the cream has broken, the caseine shells are washed out of the butter more easily than at any other stage. To use perfectly pure water in washing is perfectly safe, but it is much safer to put in a little salt and make a weak solution of brine. After the butter milk is drawn, three or four washings are put into this granulated butter, until the water runs perfectly clear. The brine should be at the temperature at which you wish to work the butter—in summer 55°, and in winter 60° or 62°. The butter is then taken out on a slab and worked and spread out and formed. In my dairy it is spread out by means of a roller and is rolled like pastry, and after it has been rendered perfectly dry by means of a sponge sopping up the moisture following the roller, we sprinkle and salt it with a fine sieve. I salt at the rate of three ounces to ten pounds. It is then worked over with spats or paddles till it is perfectly kneaded. Then covered with a cloth wrung out in brine, it is placed aside in a cool place at about the temperature of the dairy, 60°, until the salt has had time to dissolve. This I find will take from four to five hours. It is much better to work your butter the same day that it is churned than to let it remain over night. From the time butter leaves the churn until it is salted, and that salt is dissolved, butter is "sick;" it is negatively good, but it has no particular flavor; the aroma has not been developed. If, after it has been salted, it is allowed to stand twenty-four hours, the texture and aroma is developed, and if it is then broken up again by the butter worker, it is almost impossible to bring it back to its former consistency and quality. A great many dairymen avoid working at all a second time; after it has been salted, it is put in large tubs and put away ready for market. But this butter, as you have all probably noticed, is soft and sticky and more or less "salvy." There is no clean cut, no fine grain for the first few hours after it has come from the churn. As I understand it, our American authorities think that the washing out of the broken caseine shells thoroughly makes butter that will keep. If they are not washed out they are very susceptible to fermentation, and in a very few days, under favorable circumstances, the butter becomes rancid. The size of the globules that Dr. Chandler spoke about has been quite a study with me. Dr. Sturtevant and myself found that the globules of the Jersey milk are much larger than those of the Ayrshire milk. We magnified the globules 813 times, at which point the Jersey globules are about the size of English Champion peas, and running down to a coarse bird shot, whereas the Ayrshire globules ran from a small pea down to fine mustard shot.

You have probably all noticed that with a good Jersey butter cow, almost the moment her milk is placed on the shelf in the stable, it begins to change color, and before it is taken away into the dairy house, you can blow away the froth and find quite a covering of cream. That is on account of the size of the globules, which makes the separation much more rapid, and it is for this reason that you can generally make the best butter from Jersey and Guernsey cows. After being made, I put the butter at the end of five hours into half pound prints, and it is packed away in boxes, ten pounds to the layer, five layers in a box, and sent to market in fifty pound lots. Butter salted as lightly as this is very susceptible and must be used almost instantly—that is, within a week. The rule for salting butter is three times as much salt as this, or about one ounce to the pound, where it is to be kept any length of time. The three most important points in this matter are I think well expressed by a neighbor of mine, who says that to make good butter, a man must have good butter cows; secondly, he must give good feed; and thirdly, he must have cleanliness and regulation about his dairy and his stable. Butter is often very much over worked. I think a great many gentlemen who have one or two cows and make butter for their own family use, have an idea that if butter is only worked enough it is sure to be good. But more butter is spoiled by being over worked than by not being worked enough.

Dr. Chandler: I would like to ask if the reason that the fat rises so rapidly in some kinds of milk is not that the serum of the milk is heavy? Alderney milk is rich in fat and its serum—that is the portion aside from the fat—is heavier than in ordinary milk. The heavier the serum the greater the difference in specific gravity between it and the fat, and the more rapidly the latter will come to the surface—not because the globules are larger, but because the serum is heavier.

Mr. Burnett: I think that both these causes combine to produce the result.

Mr. Burden: Is there any reason why the cream rises better and makes a better butter in the deep than in the shallow pan?

Mr. Burnett: Yes, I understand that perfectly. The quicker we can cool our milk the more rapidly it rises. In a test tube, we get the per cent. of cream in about two hours, because that cools very rapidly. If we place the milk in a can which has a diameter of twelve, fifteen or sixteen inches, the separation of the cream from the milk is very slow indeed. If we reduce that down to four inches, it is very rapid. We have found, by a series of experiments, that about eight inches is the maximum. Many of you may remember the Jewett pans ten years ago. He took a pan six feet long, eight inches deep and two feet wide, and filled it with about six or seven inches of milk. He put cold water under the bottom of the pan, and the result was a very slow raising of the cream. Then somebody came along and placed the water on the sides and the ends as well as the bottom; that was called the Orange County pan. That was much more successful. Then Mr. Hardin came along and put the ice and the cold water above the milk, where it ought to be, and that was more successful still. It was found much better to use ice water than ice, because water is a better conductor of heat than the air. During this series of patent pans I invented what is called the Mosely Stoddard plan, which was simply the immersion of a can in very cold ice water. As I reasoned the thing out, all we wanted to do was to cool the top of the milk and the bottom would take care of itself.

In reply to questions, Mr. Burnett recapitulated what he had said on a previous occasion in regard to the Darlington butter. He added: My rule for a good butter feed is to feed what you can take into your own mouth and find agreeable. A man can take wheat or corn and chew it and it will leave an agreeable flavor. Or he can take clover hay that is rightly cured, and it has a most delicious odor. To me there is nothing more agreeable than the whiffs one gets from a second crop of clover that is cut and cocked and nearly dry. I am convinced, as are many of my neighbors, that two feeds a day are better for a cow than more, but we feed two long feeds. I begin at half-past five in the morning, when my cows are given their hay. We like to feed it a small jag at a time. We put in a few wisps and then let them eat it up and give them a little more. After the cows are milked their feed boxes are filled with grain, and then another feeding of hay, which will last until half-past eight or nine. After that, if the weather is pleasant, the cows are allowed a few hours in the yard; if not, only twenty minutes. But every day the cows are let out for a greater or less time. Then about half past three we give a portion of roots. I feed a bushel to three cows, and I use the yellow globe mangel. I think from a good many experiments, the carrot is the best for a cow, but you can raise a large bulk of the yellow globe mangel to the acre, and the results are very satisfactory. This is chopped up and fed, and after that a ration of hay, and then at about half-past six the barn is closed up and the cows lie down and chew their cud. I feed twice a day, but each feed extends over a period of about three hours.

The Hon. George B. Loring, after a humorous introduction, in which he touched upon the importance of the place filled by science in modern civilization, then said: While I was listening to these interesting statements, I thought how appropriate it would be to say a word or two for the benefit of the practical farmers who are here—the men who, like Mr. Burnett, feed their own cows twice a day, beginning at half-past five o'clock in the morning. Indeed, I felt it to be almost the duty of the commissioner of agriculture to say something to encourage these hard working gentlemen here, who have felled the forests, who have developed the great fruits that nourish and delight, who have brought our corn fields to the high standard which makes them the admiration of the agricultural world, who raise 550 millions of bushels of wheat annually, not only to feed themselves, voracious as they are, but also in addition no small part of the rest of the civilized world, who have taught us what grasses are most nutritious, and how to select our lands, and how to cultivate them, and who really, with their practical sense, lie at the foundation of this great business of agriculture. Dr. Loring then alluded to the story told by Bulwer of the victory in the production of flowers and grapes achieved by the unlettered gardener of a plain country gentleman, who knew little, but faithfully used that little to the best advantage, over the scientific gardener of a great nobleman, who was profoundly learned, but forgot to apply his knowledge. He added; I think that story illustrates the importance not only of knowing, but also of applying scientific facts, and I am glad to see that these scientific gentlemen who are here are willing to dine with the New York Farmers, and thus have their scientific achievements put to the test by the practical gentlemen around this board, who are engaged in lifting up the business of farming to the high standard which it is rightfully entitled to hold. I may add that I am every day more and more thankful to see that in a constantly increasing degree, in our colleges and schools everywhere, the scientific work of this age tends towards the development of practical information for the benefit of practical men.

A vote of thanks to the speakers was moved by General U. S. Grant, and having been seconded by Mr. Legrand B. Cannon was unanimously carried.

The "Farmers" then adjourned.

# The
# "New York Farmers"

HELD the closing dinner of the season of '82—'83 at the Hotel Brunswick on March 19, 1883. Mr. James A. Burden presided, and having announced as the theme of the evening "The great cattle ranches of the Far West," introduced as the first speaker Mr. Thomas Sturgis, of Cheyenne, W. T., who, he said, represented 60,000 head of cattle.

Mr. Sturgis said: After the very kind words of your chairman, I feel like responding as Dr. Holmes did to the Lecture Committee at Lowell, when they asked him to come and fill Emerson's place—"I can't fill his place, but I will rattle round in it a little." I have been congratulating myself this evening upon two things. One is that being myself a hard-fisted son of toil, I have had the pleasure of dining with the most eminent represensatives of that class of the community in the United States, and the second is that being an ardent admirer and a loyal adherent of the short-horned family of Durhams, I have been an associate guest with the gentleman who owned the sixth "Duke of Thorndale," whose name is venerable among cattle breeders all over the country—not the owner, but the animal (laughter). The subject that you have selected is one so wide in its extent, and covers, as I may say, so many acres, that I find it difficult to condense into a bird's eye view, suitable for the occasion, what you want to know. But your chairman says that you have a great deal of patience, and so I shall try to give you the factors of the problem, as I understand them. This business of cattle ranching is nothing more nor less than the breeding and raising of animals without shelter and without prepared food. That is the only way in which it differs from your way of handling cattle here. The business, like the name, comes to us from "*old*" Mexico, as it is always called in the West to distinguish it from our own territory of the same name. There the *rancheria* is the farm buildings, and the *ranchero* is the man who owns them; and the Mexicans have given us most of our nomenclature. Our men are *vaqueros*, and they rejoice in the title, for it is that of a skilled cow herder; the pens into which we turn our cattle are *corrals*, and the rope they throw over their horses is a *lariat* or *riata*.

My attention was first called to this method of cattle raising by my eminent failure in another direction. Some fifteen years ago, my partner and I settled on the borders of the Indian Territory and traded for their cattle with Choctaws, Chicasaws and Creeks. The first winter we lost 267 head out of 309, owing to the frozen rains to which the animals were subjected, and to which they were not accustomed. This fixed in my mind the fact which I am ready now to formulate as an axiom, that for the handling of cattle without shelter, the first prerequisite is a climate in which cold and rain do not coexist. Cattle will stand extremes of either, but not together. And I speak carefully, when I say "extremes"; for my own experience shows, and it is borne out by that of others, that cattle will bear any extreme of dry cold to which they are likely to be exposed in the United States. I was at Fort Garland, in the San Luis Valley, in 1873 and the post trader told me that his beef cattle had been repeatedly subjected to a temperature of 45° below zero, and yet during all that time he was able to supply beef cattle of good quality to the post. Since that time, I have repeatedly seen my own cattle exposed to a temperature of 20° or 30° below zero, for three weeks together without any perceptible injury. I have seen calves born at that temperature get up and draw their sustenance at nature's fount without any of the functions of mother or calf being disturbed. That is due to absolute dryness of the climate throughout the section of country I refer to. When the hide is dry, there is no loss of animal warmth to speak of; but, if you wet the hide and expose the animal to an ordinary degree of cold—say freezing point or even above—the loss of vitality takes place very rapidly and death ensues. The area of country over which this grazing is possible is much larger than is ordinarily supposed. You may say, roughly speaking, that all of the country from west of the one hundredth degree of longitude to the Pacific and from old Mexico to the British possessions is available for the handling of cattle in this way. I will except, however, from that such portions of the mountains as are above an elevation of 7,000 feet, for there will be too much fall of snow, and also such portions of the plateaus as are below 3,000 feet, for there, the moisture and dampness will crust and freeze over the snow and defeat the object which we wish to accomplish. That covers Colorado, Wyoming, Montana, Utah, Idaho, Nevada, Oregon and Washington Territories. The southern territories of New Mexico and Arizona form at present but a small feature of the business, chiefly on account of the absence of water.

The first two requisites in this ranch business are of course water and grass. With a small rainfall of ten or ten and a half inches per annum, you will be surprised to hear that the water should be strong and continuous, but that in these regions is the case. The streams are deep set, flowing generally from the foot hills of the mountains, and their variation is very slight from one season of the year to another. The grass is less a grass than it is a grain. The mesquite grass of Texas, the buffalo grass of Wyoming and Colorado, and the bunch grass of Northern Wyoming and Montana all carry a small seed vessel, which bears three or four grains of rich oily seed, which is not unlike, though very much smaller than millet. The grass makes all its growth during the continuance of the rains, which are in May, June and the early part of July, and it grows very rapidly. A rainfall later than that is a very unusual occurrence and after September is never seen. The grass cures upon the stalk and remains in this dry but perfect form, retaining all its saccharine matter, until the following spring. The cattle feed upon that and keep their condition admirably, as do also our riding horses. The only animals which seem to lose flesh are, as you might naturally expect, the cows which are suckling calves.

Now, as regards the method of entering into this business. The taking up a range is always preceded by the recording of a brand. The embryo ranchman proceeds to the County Clerk's office and selects any letter or figure or combination of the two, or any odd character, masonic or any thing else, which he pleases and which is not already a matter of record. For that, he receives a record in his own name which insures him the absolute ownership and use of that brand; and the existence of that brand upon the animal is *prima facie* evidence of his ownership, the laws making the alteration or counterfeiting of that brand a penal offence, just as they do here the counterfeiting of the signature to a check. It has been said that all that a man has to do to become rich is to record a brand and have an iron made. But that is a libel. The ranchman makes his location upon any fine stream or spring, not occupied by some one else, at a distance of perhaps ten or fifteen miles from his nearest neighbor, and enters from the government a small piece of land on which he puts his improvements. The Homestead Law permits a man to take 160 acres and obtain absolute title to it by improvement. That is all the ranchman obtains title to, but by placing his buildings over the country in different directions ten or fifteen miles apart, he obtains the possessory use of a large tract of country, and his neighbors respect his rights so long as he occupies the land with his cattle, and he is to all intents and purposes the owner of it. An intrusion would be regarded as a very unneighborly act, and is rarely perpetrated, because the rights of men in that country, though not defined by law, are very clearly defined by usage.

So far as the ranchman's work is concerned, the great event of the year is the general "round up," which takes place in the spring. The country in which all the ranchmen are interested is arbitrarily divided into "round up" districts, each district containing about the same average number of miles of streams. The theory of the "round up" is based upon the fact that cattle must always go to water at least once in the twenty-four hours, and that usually from ten o'clock in the morning to four o'clock in the afternoon. Therefore, between those hours you will undoubtedly find all the cattle in a certain radius of country closing in toward the water, where they expect to be at noon. The men are sent out in bodies of fifteen or twenty to drive in the cattle within that radius. The cattle are driven in by ten o'clock in the morning; they are then sorted according to their brands, and are turned over to the owners of the respective brands. That process is carried on down one of these streams to the end, up the next, down the next, until at the end of six weeks the section of country devoted to that round-up district is thoroughly worked, the cattle placed on the ranches where they belong, and the stray cattle transferred to other round-up districts. The next process is for each ranchman to gather on his own ranch the calves that may exist there. These he brands. He then selects from his herds his beef cattle—the steers of three or four or five years of age, which may be in condition for market. Those he drives to the nearest railroad point, loads in the cars and ships to Chicago, which is the only market that the cattle country tributary to the Union Pacific is accustomed to use. Usually he sends a train load of fifteen or twenty cars at once, with two of his own men, and the cattle will be six days in reaching Chicago—three days on the cars and three off for feeding and resting. They are consigned to a commission merchant, sold and the proceeds sent to the shipper on the day of arrival. This makes it a purely cash business, and this brings to my mind a remark made by an old Boston banker to a young man who asked him for an advance for the purpose of using it in the cattle business, and offered him a mortgage on his property. Said the banker: " I suppose you put your cattle under fence every night." "No," was the reply, " we don't see them more than once a year as a rule," " Well," said the banker, " young man, I would as soon take a mortgage on a school of codfish off the banks of Newfoundland." But, although the reply was witty, it was not true. I was conversing with one of the largest provision dealers in Chicago two years ago, and we had the curiosity to compare the convertibility of our assets. I said, " we have a million or a million and a half of property, and I would agree to turn that into money in ninety days. How soon can you?" He said: " I thought your assets were pretty transitory, but mine are in the pockets of about two hundred and fifty customers over the State of Illinois, and it would take me twelve months to gather them in."

We expect to get annually fifty to sixty per cent. of calves from our three-year old cows and upwards. We sometimes do better—never worse. About one-third of the two-year old heifers breed, but we pay no attention to that, and do not assume it as an item in our business. The cost of handling these cattle varies very much according to the amount you have. During our first years there with some 1,500 or 2,000 head of cattle, the expense averaged $2.50 ahead for the year's work. Now, with 60,000, we have got it down to sixty cents or seventy cents ahead; and it can probably be reduced slightly more than that. I am often asked, "What does it cost you to raise beef cattle?" The cost, roughly, may be assumed to be $10 or $12 a head, allowing a percentage of loss, &c. Such animals are now worth from four and a-half cents to five cents a pound on their feet, or $45 to $50. But the same profit cannot be realized from the other classes of animals in the herd.

Mr. Burden: What is the breed of your cattle?

Mr. Sturgis: These cattle are bred originally from Texas or from native American cattle, and crossed with three-quarter or seven-eighths short-horned bulls. A great many of the ranchmen are now beginning to use Herefords.

Mr. Burden: How do Herefords stand the climate?

Mr. Sturgis: We have not had them long enough to see, but the supposition is that they will stand it well.

To speak of cattle breeding in Wyoming and Nebraska without an allusion to the Wyoming Stock Growers' Association would be like "Hamlet" with the Prince left out. I had the pleasure of being present when that association was organized, ten years ago, with about ten members, repsenting 25,000 head of cattle, worth $500,000. It now has a membership of 250, representing 1,000,000 head of cattle, worth about $30,000,000. Last year it sent to market 200,000 head of beef cattle, which netted to the owners about $10,000,000. The money value of the shipment was equivalent to that of Texas, though one-third smaller. Texas shipped 300,000 head, producing the same net results as our 200,000.

The work of the association has been to protect the property of its members. In originally entering into business we had to encounter four primary risks—the Indians, the white outlaws and thieves with which that country was thronged, contagious disease and the climate. The first three have disappeared. The Indians disappeared through the natural progress of the country and the restriction of their movements. The next two have been eliminated by the association. Through its inspectors, who now number fifteen or twenty, the association has thoroughly patrolled the country over which the cattle of its members range. Its agents are placed at every railroad point at which cattle could get an exit from the country, forming, so to speak, a cordon around the whole northern and eastern boundary. There is an inspector at every point down the line to Kansas City, who personally sees every animal that passes through, and if not the actual property of the man in whose hands it is, or if he is not authorized by the owner the animal is seized and the man arrested. We also keep an inspector at every Indian agency where beef is delivered to the Indians, and at each of the Government military posts, and at each of the mining camps. These men make reports to my office once a week, and in this way 3,000 or 4,000 head of cattle are annually returned to the owners, worth $150,000, which would be otherwise irretrievably lost.

The second part of the work of the association was hardly less important, and that was the devising of the system of sanitary inspection, which is now thoroughly in operation. I had the pleasure of drawing up a bill, and assisting in its passage through the Legislature, which appointed a Veterinarian for the Territory and made it obligatory upon the owner of every animal brought there for breeding to have it pass an inspection and get a clean bill of health at the station at which it arrived before leaving the yards. That law has been thoroughly enforced. The Veterinarian has the authority under the law not only to quarantine during a period of safety, but also to destroy if necessary, and a fund is provided from the general taxation of the territory, levied, however, on the stock interest, to pay indemnity to such persons as may innocently suffer under the execution of the law. The bill has had, I am glad to say, the very strong approval of Dr. Loring. Could such a system be introduced here at the seaports upon outgoing cattle, the saving to this country would be enormous. This country is now a scheduled country. Great Britain scheduled it as marked with cattle disease. We are sending to Great Britain, nevertheless, one-eighth of their supply of beef. We are, however, obliged to take two cents a pound less for our meat than is brought by Scotch meat of the same quality, which is carried to Smithfield and other English markets. We take this much less because our cattle go there with the suspicion of disease. The loss to this country therefore on a shipment of 3,000 tons a week is about $125,000 or $6,000,000 a year. Dr. Loring is my authority for saying that with an expenditure of $2,000,000 annually, our seaport coasts could be made safe and an absolutely clean bill of health given to every animal.

He would be a rash man, who with the fate of Wiggins before his eyes would venture on prophesy, but if there is any relation between the law of supply and demand, the future of this cattle business is a very bright one. I make the statement that the consumption of this country is exceeding its production and markedly so.

The increase of cattle is governed by nature's laws, and is in mathematical ratio. We know that approximately the number of cattle in the United States is 40,000,000. We know that we slaughtered in this country or sent abroad last year about 6,250,000. We know practically the number of female cattle, and we can therefore tell within a fraction the number of calves that will be born in 1883. The capital that is being introduced into this business, the £6,000,000 sterling that Great Britain has sent here for this purpose during the last eighteen months, cannot to any appreciable extent increase or affect this production. The process now going on is simply one of consolidation. It is the segregating into the hands of one firm or corporation the herds which had previously been the property of a dozen men. The breeding capacity of these herds remains unchanged, and hence over production, in the sense of a rapid or forced increase to be effected by an influx of fresh capital, is impossible. With the production fixed in this mathematical way, let us glance at the sources from which we have received our beef for the last ten years. Texas was in the habit of driving in 1868 and 1869, in the neighborhood of 700,000 head of surplus cattle over her borders; last year she drove only 200,000, and every year it steadily decreases. Five years ago Utah, Nevada, Idaho, Oregon, Washington and Montana Territories all had large acccumulations of surplus cattle, and they drove out 100,000 or 150,000 a year into Wyoming, where we bought them, held them a year or so and then sent them to market. That has completely ceased. Montana has not driven a hoof of stock cattle for three years, and the other territories will not drive 10,000 head in 1883. Consequently, the territories that are raising cattle for sale and that have but a small local demand are going to be dependent in future upon the cattle they themselves breed. The enormous immigration into the Pacific States and territorities is absorbing all those regions can produce. Then how is consumption going on? Chicago received in 1880 just a million head of cattle; in 1881 between 1,400,000 and 1,500,000, and in 1882, 1,800,000; and during the last weeks of the season, when I was there in the yards, and when they were receiving 40,000 to 45,000 head of cattle a week, every head was taken out of the yards on Saturday night and the price never broke. There is certainly the strongest possible evidence that consumption is constantly increasing, and in the face of the other facts we must all allow that production, at least that part of production which is in excess of local demand is likely to decrease, and that the beef steak of the future cannot be cheaper than the beef steak of to-day.

Mr. James T. Gardiner was the next speaker. After referring to his experiences in California, while engaged in making geological surveys with Mr. Clarence King, he said that the great drawback both with California and Nevada, so far as the raising of cattle was concerned, was the fact that the grasses were annuals and the seed was liable to be eaten up, so that the ranges rapidly deteriorated if they were heavily stocked. The same might be said of parts of Utah ; in fact there was in Utah very little good cattle country. Coming to the eastern side of the Rocky Mountains, as was generally known, the plains of the Great West ran from the Missouri river, rising gradually as they came Westward, until they reached the Rocky Mountains. They rose from an altitude of perhaps 600 or 900 feet at the river up to 5,000 or 6,000 feet at the foot of the mountains, which burst up through the plains suddenly like a wall. The climate of the eastern side of the Rocky Mountains was characteristically different from that of Utah or Nevada or California. In his experience of it, which ran back to 1863, he had never known it to suffer seriously from drought. There had been times when there had been some suffering, and the grass had been scanty so that the cattle did not winter well on it, but on the whole there was very little danger from this cause. The grasses were perennials, and on the whole, both Mr. King and himself made up their minds that this was the safest part of the country for cattle raising that they had at that time explored. They had not, however, yet seen Texas. It was well to say something about selecting a range. For awhile, some men had been very successful, but had finally met with great losses, not so much from bad management as from their improper selection of a range. The cattle, wintering out, are of course dependent on the grasses that they can get during that season. If the grass is deeply covered with snow, the cattle will die.

It would be remembered that in the first winters, after the Union Pacific was opened, the trains were blockaded sometimes for two and three weeks together, and yet the ground all around was bare. Frontiersmen used to say that the snow would blow 100 miles to get into one of those railroad cuts. The snow that falls in that region is very dry, and is easily blown from the ground if you are in a place where there is wind, and one of the secrets of the success in the cattle business is to locate your range where it will be well swept by the wind. In 1870, Mr. King and himself chose a place where the mountain wall of the Rocky Mountains was broken down. The Rocky Mountains had great depressions—great open passes, through one of which the Union Pacific carried its track. The great wind of the western part of this continent was a west wind, which blew so strongly the whole year round that all the trees on the western mountain ranges had their branches turned out toward the east. In the winter this wind blows with tremendous force, and you want, therefore, to select a range that will be swept clean, and yet have sufficient shelter for the cattle. You want a broken ground with hollows where the cattle can find shelter.

After alluding to the details of a trip he had recently made in Mexico and Texas, Mr. Gardiner said the great thing to be considered in successful cattle raising was the saving of the calves, and this was originally very greatly a matter of climate. A good deal of country remained unstocked, but he fully agreed with Mr. Sturgis that the country to be stocked could not begin to keep up in production with the demand of the country for beef. The rapid increase in the demand for beef was due to the prosperity of the country. Doubtless, in the hard times, poor people went without beef, but the fact that they were now able to buy it had created an enormous demand.

A number of other brief speeches were made by Mr. Philip Dater, Gen. U. S. Grant, Mr. Sloane, Mr. Holly and Mr. Wing, and at near midnight the "Farmers" adjourned for the season.

# Proceedings

of the

# New York Farmers

SEASON 1884—85.

---

PRINT
GLOBE STATIONERY AND PRINTING CO.,
89 Liberty Street,
New York.

U. OF ILL. LIB.

## MEMBERS.

Gen'l Ulysses S. Grant, Honorary Member.

Dr. Cornelius R. Agnew.
Mr. Daniel F. Appleton.
Mr. John S. Barnes.
Mr. George A. Beck.
Mr. Frederic Bronson.
Mr. George H. Brown.
Mr. James A. Burden.
Mr. Le Grand B. Cannon.
Prof. Charles F. Chandler.
Mr. Smith Clift.
Mr. Erastus Corning.
Mr. Alfred B. Darling.
Mr. William B. Dinsmore.
Mr. Theodore A. Havemeyer.
Mr. John J. Holly.
Mr. Adrian Iselin.
Mr. John Jay.
Mr. Charles Lanier.
Dr. J. Lawrence Lee.
Mr. Johnston Livingston.
Mr. Pierre Lorillard.
Mr. J. Pierpont Morgan.
Mr. James Otis.
Mr. Henry E. Pellew.
Mr. George B. Post.
Mr. Frederic A. Potts.
Mr. Francis R. Rives.
Mr. F. Augustus Schermerhorn.
Mr. James O. Sheldon.
Mr. Samuel Sloan.
Mr. Rutherford Stuyvesant.
Mr. James Stillman.
Mr. Benjamin L. Swan.
Mr. Thomas Sturgis.
Mr. Samuel Thorne.
Mr. Edwin Thorne.
Mr. W. Austin Wadsworth.
Mr. John Hobert Warren.
Mr. John D. Wing.

### COMMITTEE ON NOMINATIONS FOR MEMBERSHIP.

Mr. Daniel F. Appleton.
Mr. John D. Wing.
Mr. Frederic Bronson.

## OFFICERS.

President, - - - Mr. LE GRAND B. CANNON.
Vice-President, - - Mr. FRANCIS R. RIVES.
Sec'y and Treas., - - Mr. JAMES OTIS.

Address of Sec'y and Treas., No. 49 Fifth Ave.

JAMES W. TOOLEY, Stenographer.

A. J. 7467

# The “New York Farmers”

DINED together at the Hotel Brunswick on the 14th December, 1883, Mr. James A. Burden presiding.

After coffee had been served, Mr. Burden introduced Professor N. H. Egleston, as the first speaker upon the subject selected fo the evening's discussion—“Tree Culture and Forestry.” Mr. Egleston said:

I am very much obliged to you for the privilege of saying a word or two upon a subject which is to me very interesting and which I believe to be very important to us all and to the country. It is a new subject nominally, though old in reality as the creation, for this world when made habitable for man was clothed with trees, and it was so arranged that the trees made it habitable for him. But you will hardly find the word “forestry” in our dictionaries, so new a term is it here, though in the old world it is a subject well known and which has been matter of legislation for hundreds of years. The present Forestry Code of France dates back to 1669, when the greatest of the ministers of Louis XIV. was aroused by the fact that the forests of France were being denuded and the country thereby harmed, and this resulted in the code which with some few modifications is the one in force to-day. In France, as in most European countries, the Bureau of Forestry ranks as one of the most important branches of the government. But in our own land, instead of conserving our forests, we have destroyed them; instead of regarding them as something to be cherished, we have considered them as of no value, except as individuals have found them to be a source of revenue by converting them into lumber. To a great extent, indeed, we have consumed them into the air—burned them to get them out of the way; and to-day, as a result, we are threatened with very great injury. The attention of the gentlemen present, however, as of many others, has at last been called to this subject, and I am very happy to see that the Chamber of Commerce are taking into consideration the preservation of the Adirondack region. I hope this movement will result in legislation so as to preserve that wooded area. This will not only be a great benefit to New York but also to the whole country, by drawing attention to a similar state of things in other portions of the Union.

The subject is a very large one. It has been estimated that in the census year of 1880 our forest products reached in amount $700,000,000, while the corn crop for the same year is returned as only $675,000,000. No less than 350,000 manufacturing establishments were kept in existence simply for the working up of wood in some shape. This shows very strikingly the extent to which we are dependent upon our forests in the arts and the great industries. Turning to the uses of forests in other respects, we have a strong illustration of these in the result of the cutting off of the wood in the Adirondack region. You have found that this great artery of commerce, the Hudson, does not flow with so full or so steady a stream as it did fifty years ago. The same is true of the Mohawk and of other streams all over the country—the navigable rivers and those only large enough for manufacturing purposes alike. On the Housatonic, within the past few years, the mill owners all along that river have had to put steam engines into their mills, because the supply of water has become far more irregular than formerly. In the spring it comes down in such torrents that they cannot use it, and in the summer season there is none to use, because the streams are dry. Reports from all over the country show that streams that were navigable fifty years ago are navigable no longer.

Now it is well understood that where the hills and the sources of the streams are protected by woods, the leaves falling from year to year and accumulating, form a great spongy soil, sometimes two feet in depth, which stores up the water as it comes down in profusion in the spring season, and retains it, so that instead of flowing off as from a house-roof and producing disastrous floods it is held in check, and sent down gradually into the streams, so that the mill owners have a steady supply that they can depend upon, the rivers remain in a navigable condition, and the salubrity of the atmosphere and the health of the people are also maintained. In Europe, it has been determined by careful investigation through a long course of years, that the best interests of the people require that from one-fourth to one-third of the area of the country should be preserved in woodland. The crops of the husbandman are thus protected from the violence of tempests which would prostrate them, and also from the chilling or blasting effects of cold or hot winds. In this way the 70 per cent. of the ground remaining after the forest lands have been reserved yield as much at least as the whole ground would if it were destitute of trees, and so the product of the woodland is so much clear gain for what it is worth as timber or firewood or for mechanical purpopses. So that, looked at from whatever point you please—in regard to health, or to commercial interests or to the æsthetics of the subject—it is plain that the trees of a country are man's best friends and ought to be cherished as such.

The lumbermen have kept on cutting and slashing through our forests at such a reckless rate that already we have but little of the first quality of our fine white pine left standing—a wood which no other wood can replace—and if it were not that it is being crowded upon the market without regard to the future its price would go up to a fabulous extent. As it is, it is 50 per cent. higher than it was six years ago. And certainly we ought to check this destruction of the forests in whatever way we can. So far as concerns the 84,000,000 acres of timber land that still belong to the nation, Congress should stop all sales of them until we can have a thorough survey of them and see what portions ought to be permanently saved. Then, such timber as could be spared without any particular detriment might be sold. I think, however, that Congress should be careful only to sell the timber and not the lands themselves, following the policy adopted by the governments of France and Germany, and even to some extent in Canada. The Canadians are generally far more enlightened in respect to their forests than we have yet become. The Dominion Parliament have passed stringent laws, for example, against forest fires. We are to-day losing as much of our lumber by forest fires as by reckless cutting. In 1880, in Pennsylvania alone, the loss from this cause was $3,000,000, and during the present year, in Colorado, it was $1,000,000. Instead of considering that our timber land was valuable to the whole people, we have been offering men a premium to go and take it and destroy it. How different is the policy of France and Germany, who spend millions of dollars a year in preserving their woodlands and manage to draw from them an annual average revenue of $1 per acre! That is the result of regulating the growth of the forests according to scientific principles.

Professor William H. Brewer, of New Haven, Connecticut, was the next speaker. He said: This subject is one to which I have given a great deal of thought. I was reared on a farm in a well timbered portion of this State in Central New York, and I helped my father in clearing up eighty acres of the heavy forests that were then to be found in Tompkins County. I saw those great forests, in course of time, cut down, piled up in log heaps and burned; and as the result of that, I find when I go back that the nice trout streams and mill streams I knew in my boyhood are either in the summer season entirely dried up or reduced to mere pools. When I went to Germany as a student, I found to my surprise that what we had been destroying with such a ruthless hand was there cultivated with the very greatest care under government supervision. Here was a great patch planted with beeches; there, another with firs; and again another with yet another tree. I got a new idea of what forestry was, and I read with interest a legal work giving the history of the laws on the subject. Originally, from a legal standpoint, the forest did not mean, as now, woodland, but a place for game. Hunting was a privilege of the nobility, and the early literature of forestry is mixed up with hunting terms. In the narrower modern sense, which confines the term to the culture of trees, I have also given the subject some attention. As the botanist on the geological survey of California I had a chance of seeing those magnificent forests of the Pacific slope, and I afterwards prepared for the first time a woodland map of the United States—having none of the excellencies of the maps which came out in the tenth census under Professor Sargent, but still a beginning.

North America has some marvelous forest features. On one little strip of land three miles long and half a mile wide, which I had occasion to examine particularly, I found a greater variety of trees growing than are to be found in all Europe, and I do not consider this as in any way an exceptional piece of land. Again, in point of size, there is only one species on the European continent that is said to attain a height of over 100 feet unless under the most exceptional circumstances. How many we have that attain such a height I cannot now enumerate, but there are perhaps a score of them. The gentleman who preceded me spoke of the money value of our trees as standing before that of all our other products. That is so, and it must continue to be so. There is no grain, no agricultural product, that, like wood, is used in every household and in almost every industry. Wood enters into the composition of almost everything we build or make, from a match to a steamship; we use it for fuel, for railroad ties, for houses. Not content with cutting off our trees, however, in reckless disregard of the future, we absolutely forbid other countries sending their timber in here, although it is a raw material for a vastly greater number of manufactures than any of the metals or any other product we can use. We cannot do without trees, and we cannot do without timber unless we revert at once to barbarism. We must have trees for the purposes of civilization, and in order to have them, we must plant them. And this brings us to an exceedingly practical question, upon which we have comparatively little scientific knowledge. The planting of trees, like farming, is an art, and the farmer, though enormously helped by science, can get along better without the science than he could without the art of practical agriculture. Science is going to help us in tree culture, but at present science knows very little about it. In beginning tree culture, there must be losses; everybody is not at once going to make money at it. The first thing to be done is to create a public sentiment in regard to this matter. The condition of things in this country is such that the government cannot help us here as in the old countries, owing to the difference in the tenure of the land. In all of the older States in America the land is now the property of individuals; and according to the American idea of land tenure, an owner of woodland, if he sees fit to do so, can cut off all his trees. We who live here cannot ask somebody else to keep the timber on his land for our benefit unless we pay him for it. So far as the government domain goes, however, I most emphatically and decidedly believe in the retaining of government reservations of timber. For these reasons, it is especially important to disseminate information and to keep this matter before the American people, and to let them know that we must plant timber, and that tree planting is going to be profitable to most, if not all, of those who engage in it. After a lecture which I once delivered on this subject I found that the practical farmers, before whom it was given, had an amount of information on the matter that was of the very greatest value. For example, Mr. A. told about allowing chestnut lands to grow up for railroad ties, and how much, almost to a dollar, it would pay. And how many railroad ties are annually used in the United States! The average life of a tie is only six years, and on some portions of the Union Pacific, by the time it was laid in the road, each tie at one time cost $6. The Pennsylvania Central gets its ties, delivered on the line of the road, for fifty cents each, and is fortunate in being able to secure such cheap supplies. It is information in regard to such points as this that is most needed. The forest problem is rendered more difficult here than in Europe also by the fact of forest fires. This is a land of droughts and it is a country of forests.

Humboldt once described this continent as the "leafy continent," and said that if you got upon any height and looked upon the expanse before you, it impressed you with its leafiness—a description which has often struck me as marvelously good. But as we also have droughts, forest fires are necessarily frequent, and the question of preserving our woodland is further complicated from this cause. What is needed especially now is a collection of the failures and successes in tree planting, so that we can tell what trees will answer our purpose best. At present nobody knows. That is a thing that science cannot tell; it must be settled by experiment. Take white oak, for example, one of our most valuable of timbers—so valuable that the British government to-day holds indirectly great tracts of it in certain portions of the United States for the use of its gun carriage factories! A great many persons have tried to plant it, but so far without success. Yet there is going to be some place in the country where it will be grown profitably. As with all other crops, there will be many failures before we find out the secret of success. So with black walnut and white pine. We shall in the end learn how to grow them profitably.

Mr. W. A. Stiles was the next speaker. He said: The term referred to by the last speaker as applied to this continent by Humboldt—the "leafy" or "forest" continent—is a very apt one, for if America is to be distinguished by any physical characteristic, it is by that. When our forefathers came here they found a continuous forest from Hudson's Bay to the Gulf of Mexico. In the Museum of Natural History may be found specimens of over 400 different woods of the United States, and there are 428 enumerated in the last census. Walk with me for half a mile along the Riverside Park and I will show you 45 different species, for I have counted them myself; and if everybody moved out of Manhattan Island and let it alone, in a hundred years hickory and white oak would be growing in Broadway among the stones. Trees will grow here if you only give them a chance. On my farm I walked across two lots last summer along the stream and I counted 32 distinct species of trees, and it is so all over the country. The variety is infinite. It is worth remembering, too, that we belong to a tree-loving race. In England, the people cherish individual trees, so that trees are pointed out that sprouted before the beginning of modern history and that have lived through many revolutions. When our ancestors came here, however, this feeling was for a time discouraged. They had to make a living out of the ground, and there was no ground to till because it was all forest, and consequently they began to cut the trees down. Everybody who had a grandfather or great-grandfather has heard it said of him that he "cleared up a farm"—a phrase heard in no other part of the world. So great have been the ravages caused by this constant and universal cutting that the change thus made in the appearance of the earth's surface can be seen from the moon. That is a fact stated by Mr. Francis Galton. But something has now got to be done to arrest this waste; there is no doubt about that. And fortunately we have reached that period of national progress when a sentimental regard for trees is again beginning to take possession of us. For my part, when a tree that has long formed a part of the landscape is cut down, I feel a sense of bereavement and loss and desolation; and no doubt you have had the same experience. That is an excellent feeling to take hold of a community, because it prompts action for preserving such trees as we have—a very important thing, since no man is going to sit down in cold blood and plant a square mile of trees just for the simple reason that it will help the climate and protect the streams. Both gentlemen who have spoken have advocated tree planting, and while I agree with them entirely, yet when you consider the enormous quantity of timber used every year for necessary purposes, I think you will see that the care of such trees as we have is a more important matter. Take the item of fuel alone. In the census year there was burned for fuel over $300,000,000 worth of wood. Who is going to plant enough trees in a year to make $300,000,000 worth of wood? Again, take white pine, the most conspicuous example of a great loss that cannot be replaced. It works so easily under the tools of the joiner, it is so light and so easily transported that when it is gone no single thing can be substituted except the red wood of California, and that covers a very limited area, and is now entirely in the hands of a syndicate of English capitalists. In 1880, ten billions of feet of white pine were cut. Who is going to plant enough white pine to cover that loss, to say nothing of the losses by fire? In the census year, in Pennsylvania alone, over 1,000 square miles of trees were burned over. In 1869, one single forest fire started in the extreme West on the Pacific slope and raged for seventy-five days till it reached the divide of the Rocky Mountains. In those seventy-five days more wood was destroyed than will be planted under any circumstances in seventy-five years. On the other hand, if we plant trees, for timber, there is this advantage—that we have the timber where we want it. For this reason the great railroad corporations are planting timber on the border of the treeless plains. We can also have just the kind of timber we want, and it has been proved further by European experiments that cultivated wood will yield more timber and of better quality than grows naturally. It is plain, however, that tree planting being totally inadequate to meet the waste in this country, the first thing to be done is to preserve our wood. Trees are made to be cut down and used, but the cutting should be done under certain restrictions. In England, as long ago as 1709, Parliament passed a law which forbade the cutting of a pine tree that was less than fifteen inches in diameter, and no stick that was suitable for the mast of a ship could be cut unless with special permission of the government. We should have similar legislation, so that the smaller trees could grow; and the lumbermen should be compelled to take away the limbs and tops of trees, which are now left on the ground and become as dry as tinder and constantly invite a fire to flash through the forest, burning the trees and the soil as well, so that not only are the existing trees destroyed but the hope of trees in the future is extinguished. Stringent laws should be passed in regard to forest fires and also in regard to the ravages of cattle, which are now allowed to browse upon tender shoots and thus do enormous damage. And the time is ripe for just this kind of legislation.

Professor Brewer: The last speaker has suggested one or two further remarks to me. My own Dutch ancestors were among the first to settle on

Long Island, and if you look over the early history of New York you will find that before the English came here the Dutch, wiser than their descendants, made laws for the protection of timber—among others, one relative to the conservation of timber on the Bowery. It is all gone there now, however! Another thing; when I was glorifying this country on its natural forest resources, I ought to have said further that the heaviest timber on earth is within the limits of the United States. We hear a great deal of the luxuriance of tropical forests, but they do not compare with some portions of our own country. There are portions of Washington territory in which it is officially stated that if the timber was cut down and made into cordwood it would form a stratum of fourteen feet thick over the whole ground; and I believe this, from what I have seen of some of the forests of that coast, to be true. As to the red wood, which forms probably the grandest forests on earth, it has one characteristic in which it has a great advantage over all other coniferous trees with which I am acquainted. If we cut down a chestnut it spreads from the roots again. Not so with the pine; not so with the spruce; not so with the fir; not so with any coniferous tree except the red wood. If the red woods fall into the hands of people who as they cut them down burn off the ground so as to get to the remoter timber more easily, there will be an end of them, of course; but if they are given a fair chance, a new growth will come down upon the ground.

Professor Egleston: It is only fair that I should state that the Department of Agriculture have lately done something in the matter of tree planting which will be of great service in the future. Some months ago they sent out circulars through all the treeless regions of the Northwest—the prairie regions—asking these questions: "What trees have you planted and with what have you been most successful in the order of preference? What trees in your experience as planters have failed and to what causes do you attribute the failure?" The answers are being formulated and will appear shortly in a suitable report. If a man understands that he has got to look thirty or forty or fifty years ahead before he is going to get his trees in a condition to cut, it is pretty important for him to know whether he will probably succeed or fail. We have found, in regard to the Dakota treeless region, that in Russia they have a very similar state of things to that prevailing there—similar especially in regard to the lack of rain, as to which it has been held by many scientific men that trees will not grow where there is less than twenty inches of rainfall. But in Russia there are regions where there is less than half that amount of rainfall and yet they have a class of trees that grow there. They are a different tree from anything we have; they have a foliage which especially adapts them to an arid region, and they are planted in a different and to us as yet unknown way. We can introduce and establish these trees in Dakota, where at the present time we know only three trees that will grow with any probability of success, and so we have a fair prospect of yet growing trees clear to our northern frontier. I think, too, we should at once establish forestry experimental stations, and that is a proper thing for the government to undertake because we cannot expect individuals to go into it. The government, having a long life and ample means, should test the various systems of tree planting, so that farmers can tell what trees they can expect to plant with profit. I may add that the American Forestry Congress, at its meeting last year in Cincinnati, appointed a committee to draw up a memorial to be presented to the several States, among other things requesting the legislatures of the various States to appoint a forestry commission, and that will be presented to the various legislatures through the Department of Agriculture within a few weeks.

Mr. Legrand B. Cannon: I can thoroughly understand that it is the province of the Federal government to withdraw from sale and preserve from desolation the public forests west of the Mississippi. I can also well understand that the State of New York should, and can, preserve what little is left of the State lands in the north woods. But it occurs to me further that the State of New York should do something to encourage plantations. Next to the carpenter and builder, the great adversaries of the forests are the railroads. Why should not a law be enacted compelling the railroads to make plantations of trees, in proportion to their mileage, thus forcing them to repair the damage they cause to the forests? This would not really be a burden upon the railroads, for the lands used for the purpose could be bought for $5 an acre or less, and in a few years the woods would be available for ties and other necessary purposes. Such a law could readily be adopted. The State should also extend her power over all lands held by private ownership in the same way as she has extended her power already over streams and rivers and has controlled the fisheries.

Hon. Warner Miller: I am not quite so much frightened by the statements made in the last census as some of the gentlemen who have spoken, because I am frank to say that the census statements in regard to forestry are in my judgment practically worthless. The census figures show that in ten years we shall be substantially without timber, but I have no fears of such a result It is true the great white pine forests of the North and Northwest are disappearing more rapidly than is desirable, and we shall have to look in the future to the Southern States for our timber for building and for ships. But there is more valuable pine timber to-day in the South, though not white pine, than there ever was in all the great Northwest. I have traveled over the pine regions of the South from end to end and I know that its value cannot be estimated in millions of dollars. Trees grow there, too, with great rapidity. If you once cease to plow for two successive years the land springs up in timber, and in five years it is as much trouble to clear it as it was originally. So I do not fear a great tree famine as yet. As to the duty of this State in regard to forests, it is my judgment that the entire Adirondack region should be again eventually owned by the State. It was so owned entirely originally, and the State, under a system when there was no thought of forestry, disposed of these lands for about five cents an acre. The State also gave some hundreds of thousands of acres to the Adirondack Land Company in connection with its charters, but of this very little has been so far cut over. The first and most practical thing to be done is to recover back all this land to the State in some proper and legitimate way. This is an economic question. The State undoubtedly holds eminent domain and can acquire it, if it is thought best, immediately by paying for it what a commission says it is worth. But certainly the State should not, as has been the case in the past, allow lands in this region to be sold for taxes. Such lands should be bid in by the State herself. I think the first move should be the appointment of a forestry commission of practical and scientific gentlemen, who should do their work efficiently and not merely travel through the woods having a good time hunting and fishing. It is impossible for the Legislature to act intelligently in the absence of reliable reports from such a commission. If the confidence of the people can be gained, I believe they would be willing to invest either one or ten millions of dollars in the Adirondack Reserve. If what we are told of that region be true, it would be cheap at fifty millions. I know it well, for I was born on its borders, and I have fished and hunted in its every township. It is without question the most wonderful country in the world; and as a resort of health and of pleasure, and as a place where gentlemen may delight to go, it has not its equal. You may go on the top of Mount Marcy or Whiteface and you may gaze for hundreds of miles over our "leafy continent," an expanse of woods from one end to the other, dotted here and there by the most beautiful lakes and threaded with streams. This is being cut into by the lumbermen from all sides, but you cannot stop cutting lumber because you need it as much as you do iron or brass. The only thing to be done is to do what Europe is doing—preserve the forest lands and then decide what portions should be cut each year and what size the timber must be before it is cut. It is a fact that the forests of the Adirondacks (and they are largely spruce) will grow in about twenty-five years. I know a large lumber company in the northern part of Herkimer County, and have been informed by them that they have been cutting and lumbering in one particular region thirty years, and that they are now re-cutting the same land they cut twenty-five years ago, and the spruce on this land is as good as it ever was. They cut only the sawing timber, leaving the small trees, and thus they expect to preserve their territory perpetually. That is a bit of practical experience which to my mind has great weight.

The "Farmers" then adjourned.

# The “New York Farmers”

AGAIN dined together at the Hotel Brunswick on the 21st January, 1884. Mr. James A. Burden presided, and, as soon as coffee had been served, introduced Professor Wm. H. Brewer, of New Haven, Conn., as the first speaker upon the theme of the evening—“Meadow and Pasture Grasses.”

Professor Brewer said: The grasses, speaking botanically, constitute a vast order or family of plants, embracing nobody knows how many species. The old botanists used to say that there were 5,000 or 6,000, but the modern ones say not more than 3,100 or 3,400. These grasses grow in all lands, have a great variety of character, and contain among their species by far the most valuable plants known to man—that is to say, all the grains and all of the more important pasturage or fodder plants. There are nearly 600 species of grasses that are known to botanists as growing within the limits of the United States, but out of that vast number it is probable that 19-20ths of our grass pasturage is made up of twenty or thirty species, while, of the rest, many are worthless and a few are worse than worthless. A great many species, too, are known merely as botanical curiosities.

Pastures, if of the right kind, increase in value with age. They grow better as they grow older, providing they have been well treated, and old pastures differ from new ones in a variety of ways. Those of you who have been in Europe have noticed the marvelous turf of the northern portions of that continent—of Holland, England, Scotland, Ireland, the Alps. Knowing the way in which we produce pastures by the sowing of grain and laying them down, you probably have no appreciation, unless you have looked into the matter, of how those European pastures came about. The great majority of the old pastures of the Old World were never sown; they are in a sense, but in a sense only, natural pastures. There are pastures in Switzerland, as there are even in England, in which, so far as is known, there has never been a plow or a spade. Seeding down to grass is an American institution and originated here and not there. Those European pastures represent the growth of plants that have come in the ground under cultivation and under the care of men, and with only partial seeding.

As I have said, the family of grasses is a vast one. Some of the species are annual—that is, they die down entirely every year. Others only die down to the roots and are perennial. A number, but not all, of the perennial grasses that belong to cold and wet climates are capable of having what is called a sod or turf. But no hot climate has a turf; it cannot have one, for the grasses which produce turfs do not grow there. There is no turf in the tropics, unless you get on the high mountains, and even there the turf is very poor indeed in our sense of the word. The turfs of this country and of Northern Europe are made up of a variety of species—not of any one species, but of a variety growing together in which the roots are perennial, living nobody knows how many years, but many. The tops may be fed off, or else die down or nearly down to the surface of the ground—not all the leaves dying, however, for they remain green under the snow. The grasses of hot and dry climates have a tendency to grow up singly—each for itself—not forming a turf; and if they are perennial, instead of forming a turf, they generally grow in bunches. The bunch grasses of the Rocky Mountains and of California, for example, are perennial grasses which do not form a turf, though numbers of them are of the same species which in the East spread over the whole ground and form a sod. The more valuable meadow and pasture grasses of the North of Europe are the ones that we have also. It is indeed impossible to-day to tell how many of our grasses are native and how many are not. I do not think it is by any means settled whether even blue grass is a native of this country. That it was found further west than our settlements there is no question, but that is by no means conclusive proof on the subject. We do know, however, that the early settlers had very hard work with their stock. The towns in New England, and New York and Long Island laid off what were called "meadow lands," but these were really only salt meadows. There are numbers of plants whose popular name indicates a belief that they strengthen cattle. In the days of the early settlers such plants were given to the cattle in the spring to enable them to get strong again, for they usually came through the winter so weak that the first duty of the farmer in the morning was to help them to get on their feet to eat such breakfast as he could give them. As a consequence of this poverty of pasture lands we had to sow grass here before they did so in the Old World, and the seeding of lands to grass, which is now common wherever agriculture is practised, originated in this country and went to the Old World from here. We took plants that in Europe were supposed to be of little value and cultivated them. I do not know that it can be determined whether timothy is a native of this country, but at any rate it was first cultivated here. But the farmers of the Old World, though they did not seed their lands to grass, had been for centuries in the habit of cherishing their pastures in such a way as to allow grasses that were useful to come into the land. They spread manure in the fall of the year over the surface of the ground, and in many various ways took pains to encourage the growth of those grasses that were of value to their stock, and to get rid of those that were injurious. The evolution of animals and plants is an old doctrine among farmers, but we hardly yet appreciate as we should that many of our pasture grasses have been improved—insensibly perhaps, but as truly—as any of the garden vegetables have been by cultivation.

Precisely when those Old World pastures began I do not know, but it was certainly away back in the days when the people were just emerging from barbarism, or were, indeed, yet barbarous, and by care they have been brought to their present condition. It is a popular belief in England that no pasture comes to its full value before it is fifty years old. But what, after all, is the real difference between an old pasture and a new one? We can lay down a pasture, and do every year, by sowing on grass seeds. But such a pasture, while it may furnish a considerable amount of fodder, does not, especially if it is on the right kind of soil, furnish as much as it does later nor has what it furnishes the same qualities for certain uses which I will hereafter refer to. In the first place, the old pasture gradually acquires a larger number of species, and the soil will support several different species better than it will one. Anybody can see that the natural condition of wild vegetation the world over is not that the land should be clothed with one species, but with many. When we put down the land to grass, we sow only two or three kinds of seed, but in any old pasture there are many more than that. You will notice that in the new pasture, with its two or three kinds of grass only, there are "poor spots," and if the leaves are pushed aside, portions of the ground are seen to be uncovered. But in an old pasture, different kinds get in and cover the ground more completely, interlacing their roots, taking somewhat different constituents from the soil, sheltering the soil more thoroughly from the sun, and in a very natural way producing more food than will be produced by the growth of only one or two species. And, as pastures grow old, the species that are best adapted to that particular soil work in in this way, unless the pasture has been overstocked and abused, and so, ultimately, the best possible form of sod or turf is produced. I will say further that it is my belief, though I cannot prove it, that an old pasture is better fitted than a new one for the production of various agricultural articles which are used not raw but after some certain process. I do not know of any region that is a new one that has ever become celebrated for its milk or cheese. You can produce a large amount of them, but neither the butter nor the cheese are as good. This is analogous to several other similar cases where we use a product which is not a primary but a secondary one. Take wine, for example. I do not believe a case can be cited where a famous or excellent wine is produced on new soil. Good wines all come from old regions and old vineyards, and where we attempt to grow wine in a new region, it is invariably the case that it takes a long time before we get those varieties of grapes and that particular subjugation of the soil which is necessary to produce growths which will yield wine of the best quality. Tobacco, again, is grown in a great many countries, and new lands will produce tremendous crops. But did any of you ever hear of a famous brand of tobacco coming from a new region? It is from the old and long cultivated regions of Turkey, Persia, China, Cuba, the Connecticut Valley that the finer brands come. The same thing I believe to be true, though, as I say, I cannot prove it, in the case of pastures. The most famous cheese and butter certainly come from old pastures and from regions that have been for some time under cultivation, and it would seem as if for the production of grass yielding the best butter and cheese, a certain amount of "age" in the subjugation of the soil and a special adaptation of the grasses to the soil were necessary.

Our pastures differ also from those of the Old World in their diseases and mishaps. America, for instance, is peculiarly rich—as the entomologists say—in insects. From mosquitoes up or down, according to which way you classify animals, it is a land of insects, and they prey on our crops as they do not upon those of any other land. The Hessian fly was not bad in his own country—no worse than the Hessians were at home—but introduced here, what a pest they have become! The potato bug and numerous other insect foes of the farmer have originated here, and other insects, when imported here, have developed a talent for mischief they never showed at home. In this way our pastures seriously suffer. Pastures also may be abused. I have no golden rule to lay down as to which are the best species of grasses to encourage, for agriculture is an art and not a science, and while science can help it, art and experience can alone teach us which are the best species for any particular region. In Kentucky, for Kentucky soils, I do not believe there can be anything better than the Kentucky blue grass, but it does not necessarily follow that that is the best kind of grass for every kind of soil or in every region. We can only say that it is good for a good many. I may here say a word or two about Western stock raising. While no new soil and no new pasturage region produces as good butter and cheese as an old one, it can produce as good beef; indeed, it very frequently gives a flavor to beef that is lacking in the older pastures of the East. But I think the Eastern stock-grower is unduly frightened over the magnitude of the stock interests in the West. I believe that stock raising in those great ranches west of the 100th meridian has reached its zenith and that the times for making great fortunes in it have passed. I speak from a good deal of observation, for I have been over a large part of the Western country and under circumstances which gave me special chances for seeing, and when I was the botanist for the State of California in the geological survey, I gave a great deal of thought and attention to the matter of forage plants there—a very peculiar problem. I wrote all over the world to every dry climate to find what we could introduce to take the place of the native grasses that were so rapidly being exterminated. I saw the cattle business rise to its zenith in that State and begin to decline; and then the sheep business came up, and was rapidly rising before I left there, and I have been there since it, too, reached its zenith. I have also carefully looked over the census reports, and it seems to me as if in every place this was the fact—the big fortunes made in growing stock have been made by feeding animals on somebody else's land. And, if somebody else does not object, you can make bigger fortunes in that way in New England than in the Rocky Mountains. But here, the somebody else objects, and in Texas somebody else is also beginning to object. The great fortunes, as I say, have been made by pasturing cattle on lands that belong to Uncle Sam or somebody else, and in that way rapidly taking off the pasturage which has been accumulating for centuries. The history has generally been this—I do not say in all places but in most—

a few cattle would be brought on in the better places for pasturage; then more would be brought; the land would soon become overstocked; in course of time cattle would cease to be profitably grown there, but sheep could be grown and sheep would be brought on until they too ceased to be profitable, and the last state of that land would be worse than the first—a good deal worse. The finest bunch grass I ever saw was north of the Columbia and Snake Rivers in Washington Territory—a magnificent growth; but to-day, in that very region, you can go over not thousands of acres, but thousands of square miles and find the land as bare as this room floor—land so completely and entirely cropped off that it would take fifty acres to support one sheep. In California, the native grasses were slowly run out, partially by feeding and partially by foreign grasses that came in. Every one has heard of the Californian wild oats. What are the wild oats? It is a native plant of the Mediterranean region, found in Northern Africa and in the South of France, and it came with Spanish emigration to America. There were places on the coast ranges of the Pacific Coast in 1851 and 1852 where it was four and five feet high, but in 1860 it was gone completely and entirely, and in its place a kind of grass known as squirrel grass came in, and, as you know, the cattle interests of California declined, and agriculture took their place, and as the lands are fenced up and artificial grasses are raised, they begin again to do very well. Now, in the great interior regions of this continent, the cattle growers have got to limit their production or the same fate will come upon them that came upon California. I have already said that there are certain injurious grasses. If a grass is nutritious and is liked by cattle, and more cattle are turned on than the grass will feed, of course they will exterminate it. But Nature does not like to see her face left entirely bare, and so the grasses that come in are those that can live in spite of cattle—they must be either those that are not nutritious or those that cattle do not like or those that are positively injurious. The latter, of course, holds the best chance in this fight. I have in my mind's eye to-day a large range that at the time I explored it could support many thousands of head of cattle. It supported cattle as long as they could be grown profitably; then it was turned into a sheep range, was once more overstocked, and I have to-day letters that show that last year 800 lambs were killed on that particular range by the seeds of a particular plant boring into their flesh, or pushing into and putting out their eyes. That is a plant that fights its own way. Within a week I have heard of a similar plant in Texas that bores its way through the wool and into the bodies of sheep in a like fashion—and *overstocking* produces it. Why don't we have that in the East? Because we have produced our pastures artificially of such useful plants as will grow, and they are cultivated. Those other regions are regions where no pains was taken to replace what was destroyed, and so only those species came in which could fight their own way under adverse conditions. And so, while Western competition in beef and in wool will continue, we now begin to stand a better chance. It is a great natural law, the reason for which it would take much time to tell, that whenever agricultural competition becomes so severe that grain cannot be raised profitably, then the amount of land in pasturage increases. In England, just as their grain production has been crowded by American competition their pasture has increased. So, in the East, with the competition of the West, the pasturage area has increased. One reason for this is that grass grows more months in the year than grain. Another is that by care we can increase the production of grass more than we can that of grain. Yet another reason is that grass gives us a better chance to keep up the fertility of the soil. Hard cropping by grains and selling off the product brings in the end desolation; it must do it; or, at least, the only country in the world where it has not done it is Egypt, where there is a particular reason why it should not—the enrichment of the soil by the overflows of the Nile. In Italy, Spain, Greece, Palestine, agricultural over-production has brought desolation, and they all produce less to-day than they did 2,000 years ago. But in Northern Europe, where they have an agriculture with animals, look what an enormous population is supported—in some portions of Holland greater than even in China! Many things in political history really turn on something in agriculture, and a noted French writer says that if you want to find the real deep underlying causes of the difference between the decadence in Southern Europe and the ascendance of Northern Europe, you must look not at the great battles or the great kings, but at the dung heaps. A New York farmer who went South long before the war told me the reason he came back. "The North," said he, "is a country of barnyards and you have manure; the South is without barnyards and you have no manure; and the North is always going to beat the South in the race for wealth." Now, this barnyard business turns a good deal on your pastures, and with cattle and pastures we have the means, if not of entirely preserving fertility, at least of so retarding exhaustion that it gives an enormous advantage in this struggle which has now come on in agriculture as in other pursuits.

Mr. Burden: I would like to ask the Professor if he can give us any idea as to the difference in value between an old and a young pasture? I have had some experience on this subject, but have not reduced it to figures. I know a pasture that has been down fifty years, and I think in a dry season it would feed double the same number of cattle as a younger pasture.

Professor Brewer: I think it depends on the land, I could not give any numerical value. There are a good many things in farming that cannot be reduced to figures. Our productive industries may roughly be classed under four heads—mining, fisheries, manufactures and agriculture. The principles of production in manufactures and agriculture are so totally different from the very foundation that the same principles do not apply. In the case of the first, you can calculate how much each thing is going to cost. You know how much work a man can do and what the product of his labor will be, and if you know also the cost of the raw materials, you have control of all the results except the markets. But in agriculture, you cannot tell what the cost of production is going to be. No man can tell how much it will cost him to plow his ground. A rain coming at an opportune time may diminish it, or a drought may increase it. All through the process, from the sowing of the grain to the harvest, he has no control over the results, and where a man grows but a single product, he may be a heavy loser. But where he grows a variety of things, as is usually the case, he does well on some, and only on some he loses money. There is no year that is a bad year for everything, and that is the reason why mixed farming is one of the safest avocations to make a living at though not to get rich. The cost of growing a particular thing can only be calculated by an average running over a number of years. If it becomes unusually profitable, everybody begins to grow it and the profits comes down; and if it is cultivated at a positive loss, for several years, it goes out of cultivation. You may kill manufactures by strong competition or hostile laws or in a variety of ways, but you cannot kill agriculture. I cannot conceive of a harder condition for agriculture than that of Ireland in the religous wars of 200 years ago. It is said the soldiers carried scythes to cut down the grain. But a new plant—potatoes—was introduced, which could be put into the ground with the spade and was adapted to garden and field cultivation alike. No animal would eat its tops; a hostile army could be turned in and trample on the ground without injury; as soon as they were big enough, they were ready to be eaten, or if they were not harvested, they could lie till the next spring, and a spade was the only implement needed to take them from the ground. Dig up your potatoes, roast them, and you could live; even if an army dug them up, they could not burn them; and when they dumped them in a bog the miserable inhabitants fished them out. You cannot exterminate agriculture from a country without exterminating its inhabitants. It adapts itself to any and every condition. But while it is suited to men of every degree of talent, its methods are complicated. Now more of this and now more of that will be grown, and their relative interdependence is such that you cannot calculate the cost of any one. Two or three crops are blended together, and you cannot separate them. I once tried to calculate on a farm how much a man's own work would be worth, and I found that if I was charging good high fees for my time, I was getting poorly paid, but if I was working for nothing, I was doing very well.

Mr. Clift: I own a farm, the majority of which has been a grass farm for the last fifty years, and during the last five or ten years the droughts have injured it seriously with the exception of two lots, which were so stony that they have never in my memory been touched with a plow. Why is it that stony lands keep green when clear lands dry up?

Professor Brewer: Because you cannot plow it; I have always thought that was the solution of the question. Stones are the poor man's manure. There is probably also some difference in the texture of the soil. There is a great difference in the rate of evaporation from different soils, and the same soil has different degrees of compactness. In this special case, the probabilities are that you have got grasses which have come in and have become so adapted to the soil that they flourish there and keep it in good condition.

Mr. Otis: What is the best way to deal with the Canada thistle?

Professor Brewer: It is according to where you are. I have seen places where it is quite easily extinguished by cutting it. You cannot do this in grain, but in pastures or anything of that kind, if you cut them as they come in blossom, say twice or thrice a year, sometimes two years will kill them. There are other places I know of where the only way is to sell out and move.

Mr. LeGrand B. Cannon: While I confess that after farming for six years I know about as little of it as when I begun, I will, as requested by the President, give briefly the results which have been accomplished on my land. The theory we adopted was to plow the equivalent of the entire farm once in five years, and a rotation of crops. The first year we put on the green sward oats, the second, we manured heavily and put on corn, the third year we seeded down with barley, and the fourth year took our crop off the meadow. In this way, without resorting to any artificial manures whatever, the product of the farm has increased, according to the crops of the last two years, threefold. Last year from 275 acres we cut 342 tons of hay, as it passed over the scale; and besides that, we housed 245 tons of ensilage and have produced 2,237 bushels of grain. Reduced to weight, in a green form, this is equivalent to fully three tons to the acre. This comes strictly from the use of barnyard manures, and by raising large corn crops, which give us a large volume of straw that has been used in littering the yards and stables and always returned to the farm.

Mr. Havemeyer: At the request of the Chairman, I will give you the result of my experiments with ensilage. I am satisfied that on my place, it has been an excellent substitute for hay, and has furnished me with a cheaper fodder for my cattle and herd than I could have obtained from any other cereal or crop. The quantities I give you are perfectly reliable, because the number of acres have been surveyed and the crop weighed. The best land on my farm has produced me two tons of hay to the acre, but I consider that an exceptional crop. From the same land I raised thirty-three tons of ensilage fodder. I calculate the value of ensilage to be in the proportion of two and one-half to one of hay; consequently an acre of land that formerly, if we say one ton of hay would feed a cow a certain time and two tons of ensilage would feed it for the same period, gave me feed for one cow now feeds with ensilage fifteen. I had so much ensilage that though my pits contain two thousand tons, I was obliged to stack four hundred tons and dry it. I fed solely with ensilage from the 1st of October, 1881, to the 1st of October, 1882, about one hundred and fifty cattle, I should say—that is, I mean that they did not eat hay. I thought I would make the trial and the experiment has succeeded admirably in every way. The increase in butter has been very large. I have taken ten cows and put them on hay feed and their milk has gone off right away. As to the quality of the butter, all I can say is, that I sell all my product for fifty-five cents a pound. Some of my neighbors have failed with ensilage, however, and I think I know why. The ensilage, to be preserved at all, must be preserved properly by the simple method of compressing it so firmly as to prohibit the release of gases. Ensilage is nothing new. In Germany, the raising of cattle is one of the principal items of profit in the cultivation of sugar from beets, as they are fed from the beet ensilage.

Beet ensilage is preserved for years, and the saying is that the older it is the better it is.

Mr. Tucker briefly confirmed the opinion of Professor Brewer that the business of cattle raising in the West had reached its maximum and would decline under the influence of overstocking, and thanked the club for its disinterested services in behalf of intelligent agriculture.

The "Farmers" then adjourned.

# The “New York Farmers”

DINED together again on the 11th December, 1884, Hon. John Jay presiding.

As soon as coffee had been served, Mr. Jay announced as the subject of discussion, “Horse Raising in the Eastern States,” and introduced as the first speaker Mr. Bowditch, who spoke as follows:

The subject of horse raising is an interesting one, because, when undertaken for the purpose of profit, it is comparatively new in the Eastern States. The experiments so far made do not seem to me to have been altogether successful. Raising trotters has certainly not always been successful; I know that I, at least, can speak with some little feeling on that subject. The thoroughbred does not seem entirely to fill the bill. We want to raise a horse such as will ensure us against drawing absolute blanks—one that will always sell for enough to pay the cost of raising him, even if he does not turn out to be a prize. It seems to me that the horse we need is one that the farmer can do his work with while young and before he is quite ready for the market, large enough to do his work, quick enough to go home speedily with an empty wagon, and with style and good looks enough to be acceptable to city purchasers. The only breeds that I have come in contact with that come near filling that description are either the large English cob, which we know very little about here, or the Percheron. In watching the horses that have come into market, I have noticed that during the past few years these Percherons are coming in more and more, and among them there are some that are very stylish. I have seen a great many of them on very handsome carriages in the streets of New York within the last day or two. They have the necessary style; and from its breeding, in some way unknown to me unless it is from the Arabian cross which was formerly given to it, the Percheron has the power of impressing its stamp on all sorts of mares—even on the small broncho mare that weighs only 600 or 700 pounds, growing from that animal a colt that in some cases will weigh 1,000 or 1,200 pounds, and yet be in perfect proportion, with sound legs and feet, great power of endurance, and that will come to maturity very early. In the District of Perche they begin to work them at twenty-two or twenty-four months old, so that they more than pay the farmer for their keep after they are two years old. It is plain that if we can breed them in the Eastern States as they do there, making them pay for their keep at that early age, we can afford to sell them at the market prices when they are four or five years old. I have watched these horses closely for the past few years and I do not know any work that a Percheron of that sort is not fittted for. It certainly is fitted for farm work, and for light driving and heavy driving and for the saddle. I know several of them that have proved most excellent saddle horses, not only on the road, but also to a limited extent for cross country riding. It is very much harder for us to raise horses in the Eastern States than it is further West, because we have to feed so many more months. But I think that one reason why our horses do not find a better market is that we do not pay enough attention to the early handling of colts. More than half the horses that are brought into the market are unfit for sale and unsafe for use. My little experience convinces me that it is with colts as with our own children—if you let them go wild until half grown, it is very hard after that to make them behave themselves. My own practice with colts is to halter break them within twenty-four hours, and there is no more trouble in that than to tie up a pup. It is a fight for a few minutes and then it is all over; and with very little trouble and gentle handling a colt at a week old can be led by a child with the most perfect ease. I have got colts of all ages up to two years that are perfectly safe for children to pick up their hind feet; they don't object to it in the least; and when they first have the harness put on them, they have become so used to having straps and halter ropes and to having people about them that they are not surprised. There is really no breaking in handling colts in that way, and if they are put to moderate use on the farm at an early age, by the time they have worked a year or so they have become used to everything, afraid of nothing, and ready for market whenever the buyer comes along. Farmers have laughed at me when I have told them they need lose hardly any of the time of their work horses by using the mares for breeding. This year I took my carry-all mare—which means that she worked all day long and a good deal of it—and drove her to within two days of her foaling, and she raised a very good colt that kept in perfect health. The colt was separated from her after the fourth day from morning to noon and noon to night, but was with the mare all night. Another horse I drove to the village the day before she foaled, and when I ordered her again the next morning, the man said "she dropped a colt two hours ago." I drove her again the next day but one, and she has been in very good condition ever since. From that little experience it seems to me that the idea ought to be exploded that a mare cannot raise a good colt and do her full work. Of course, she needs a little better treatment and food. Farm work is very much easier than that of a carry-all when you have to go in a hurry, and I see no reason at all why any farmers who have got a sound mare—and no one would think of raising a good colt from one that was not sound—cannot make horse raising profitable if they only try with common sense and judgment, for if you can raise a colt without losing much of the time of the mare, and begin to make him pay his way at two years old, the expense of raising him cannot be over $80 or $90 at the outside. The time that a colt gets his check is just after he is weaned. They then need a little extra care. After they are once over their weaning, I do not believe in forcing them very high. If colts are inclined to grow fast and grow fat, it does them more harm than good to be fed too much grain unless they take enough exercise. When they are large and strong and mature enough to do a little light work they will be all the better for being made useful, and they will pay for the extra feed in the work they do.

Mr. Cannon: Taking a colt of average constitution, what time do you actually wean?

Mr. Bowditch: At about five months.

Mr. Cannon: And then the colt takes care of himself?

Mr. Bowditch: Yes, through the summer. On a dairy farm, where I have plenty of skim silk, if it is convenient and the colt takes to it kindly, I am inclined to give a little skim milk. Let me tell you also one thing worth knowing about skim milk. In my own raising of horses I have been troubled with worms more than anything else, and for worms, skim milk is the best of remedies. It acts within two or three days, and in a very effective manner.

Mr. Lawrence, having been called upon by the chairman, said: I don't know exactly that I have anything much to say on this subject, although I have farmed for ten years, and have had for the past three or four years half a dozen mares and a stallion and have bred colts with more or less success—rather less than more, owing to accidents and the expense of keeping them and one thing and another. I entirely endorse and believe in much that Mr. Bowditch has spoken of the Percheron, although I think that the expense of raising a colt would be usually more than he states. I think a colt at four years of age would cost to raise from $350 to $400. I would like to call your attention to another breed—the Norfolk roadster—of which my brother has recently imported a fine specimen. They are a short legged, short backed, sloping shouldered, good bowed, clean footed, clean breasted, good headed breed of horses, with high action and good wind. They will make a mile in three or three and a half minutes with a heavy load behind them; and they will carry a good weight—200 pounds or more—in the saddle, and carry it for a long time. They are showy horses, standing anywhere from 15 hands to 15.3, and they can be brought into use at four years old. I think if we were to use stallions of that description—and it is not necessary to go to England to get them, for they are to be found in perfection in Kentucky—upon good bodied, short legged mares, we might breed a useful horse. We want especially a horse that from the time he is two years old can be brought into use. In Perche, they work the colts in strings—not singly. They take usually four colts of two years old together, and when they are three years old they work two colts together, and at four the colts are fit to work alone. In that way they make them pay for their living, and all the while they are getting gentle and harness wise.

Mr. F. R. Rives: I think that the statement which Mr. Bowditch made in reference to the requirements of us agricultural people as to the characteristics of the horse needed in this country for general uses is absolutely perfect. But on a horsey subject few men are expected to agree, and I must enter my dissent very decidedly from his views in regard to the Percheron. It is an excellent type of animal, admirably adapted to its particular purpose, but I think some of the gentlemen present will bear me out in stating that the French themselves, whenever they want a "*cheval de luxe*," select from the "*races distinguées*," which they seek across the British Channel or on the other shore of the Mediterranean Sea. I have never seen a gentleman drive or ride a Percheron in the Bois de Boulogne.

The late Emperor Napoleon did more for the amelioration of the breed of horses in France than any one else, and the chief medium of improvement was the thoroughbred of England—the *sang pur*. That is the breed which I think has caused the great improvement in the cavalry horses all over the world. Not only the French but the Austria-Hungarian and also the Prussian Government have annually sent agents to England for the purpose of buying the best types of the thoroughbred horse at very long prices. They don't buy a thoroughbred horse merely because he is the own brother of a celebrated sire, for such an own brother may be a miserable, weedy, ill-shaped animal who has the capacity of communicating his individual defects much more than the virtues of heredity. The Uhlan horses were mostly improved through the English thoroughbred.

In this country recently we have had some magnificent specimens imported of the French coaching stallion, and from an inspection of them and their pedigrees I am satisfied that they have not a drop of French blood in their veins. In England, in speaking with one of the greatest breeders, he told me that he thought the grandest horse on the face of the earth was by a thoroughbred stallion out of a Cleveland bay mare. I suppose the most valuable class of English horses are their hunters, and there is no doubt that at least 999 out of every 1,000 of them are got by thoroughbred stallions. There is no distinct breed of hunters in England. The hunter is produced from an animal that generally on the sire's side could not carry a heavy weight and out of a mare that has not speed. It is a cross, but the cross is very efficient. I made it my business to go to the greatest horse breeding county in England—Yorkshire.

Omitting the mammoth breeds on one side and the dwarf breeds on the other, there are but three distinct races of horses in England—first, the thoroughbred; secondly, what they call the coaching or carriage horse, and thirdly, the nag or roadster. The thoroughbred horse is endorsed by the Royal Agricultural Society of England, not for the purposes of racing or as a gambling machine at all, but merely as a producer, if he is of the right type, of hunters; that is the only way they recognize him as an important instrument of rural economy. The Cleveland bay breed is, properly speaking, the coaching horse of England. He is a horse, like in form to a great extent to the blood horse, but on a very much larger scale, so that the two breeds mix together well. With the greater speed required in modern times, they have, however, almost rendered the breed in its purity extinct by crossing it with the thoroughbred. The third type is the "nag" or roadster horse, a low horse, with remarkable trotting action, which is used chiefly by the farmers of England not for agricultural purposes but to draw their market wagons, and they formerly rode them on the road a good deal. But in this country our great ambition and desire is to have a horse that will make himself generally useful on or off the place. It seems to me therefore that for the improvement of the horses in this country we must look either to the thoroughbred stallion, which is the source of the improvement in all the breeds for quick work, or to the Cleveland bays. With regard to the Norfolk trotter or roadster he has been very much improved of late years, but also by an admixture with the blood horse, which has given him a finer head and a good deal more finish. The English Government some years ago, with a view to mount their cavalry in India, sent out a good many Cleveland bays in the hope that they would bring up the size of the native cavalry horses. The blood horse in Germany, crossed on the native mares, has effected a marvellous improvement in the cavalry. In Russia, too, they have imported largely of the blood horse and also of the carriage horse. In Spain even they have imported them, and in Italy there is a very good show of them.

The great difficulty in regard to the Oriental races of horses is that they are for the most part too small for any useful purpose, and the English thoroughbred horse is a gradual improvement of the figure and enlargement of the size, at the same time preserving most of the qualities. There is a dictum of Admiral Rous that the thoroughbred of England is a horse without one drop of any other than Eastern blood, but I believe that is a fallacy. I think these Oriental horses were crossed in the early days on the native mares, while only a few royal mares were imported. In the pedigree of old Eclipse I believe there are thirteen mares of entirely unknown origin, and the presumption is that they were the native mares of the country.

With regard generally to the Percheron, again, General Lamoricière made a report to the *conseil des Haras*, in which he said he had tested with a good deal of care the large British races in ploughing and in purely agricultural work, and he found that the Clydesdale of Scotland performed their work quicker than any of the native races of France. I have never seen, in any of the first crosses between the high bred horse and the Percheron, perfect symmetry of results. I have invariably seen the rather short neck of the Percheron with the drooping and cloven quarters, and it has never seemed to me that the result has been a harmonious one until after the lapse of a very considerable time. The Percheron is the archetype or pattern of all the French horses—remarkably hardy, remarkably docile.

With regard to the remark of Mr. Bowditch in reference to the management of colts, it is eminently true and just. From the wide diffusion of the ownership of horses on this side of the water, it happens for the most part that the owner, or at least a man immediately under his eye, breaks the animal. I have actually known colts to be broken at six months old—the foal hitched with the old dam so that it does not pull a pound; and it is a source of great wonder to Europeans that our horses are so uniformly excellent in their temper. They commend, besides their remarkable docility, their endurance, the latter arising from the fact—though I am afraid we are departing from the rule now somewhat—that we do not work our horses as young as they do. You cannot burn the candle at both ends. Lady Suffolk trotted her fastest at the age of eighteen years—an age which a horse, to be of any account, rarely attains in Europe.

One of the reasons why the breeding of horses as an industry is very much depressed in the Eastern States and New York is this:—for a series of years our farmers have been breeding to the fastest trotting stallions without any respect to size or figure, and they would have been content—even delighted—to have a three-cornered animal of a green color, provided he could scramble over the ground faster than any other horse; and the result has been that if the horse failed as a fast trotter he has been absolutely worthless. Now, in this country, New York is the best market for horses, and to sell well here good looks are necessary. We have no paternal government to encourage the production of horses, but I hope the rich gentlemen of the country will do their best in introducing the various breeds and in encouraging the farmers to patronize the stock so introduced.

Mr. Cannon: The only success whatever I ever had in breeding was by the use of a cross of the thoroughbred upon our native mares. I can, however, add nothing to what has been already so ably said, and I wish only to say that within our own lives there has been a marked and substantial change in the discipline and treatment of horses. The vulgar, brutal, ignorant treatment by which a horse was subdued has been entirely done away with, and that has come about through the agency of an American mind. I doubt if any one of us appreciate how largely Mr. Rarey contributed to that reform by showing us that the agency of confidence is as potent as the agency of fear!

Mr. Rives: I would like to add that one of the greatest English breeders told me that he thought the finest action he had ever seen in any horse was that of the best type of American trotter when extended. I think that is a merited and deserved compliment. From the great extent of stride, the perfectly and absolutely true action, he greatly preferred it to the English high stepping—an action for show and fashion which he said involved an enormous waste of space and time and caused inflammatory diseases of the feet and legs, that rendered the horse unfit for driving except every other day, the feet in the meantime requiring thorough soaking. Another thing:—Mr. Bowditch referred to the English cob. There is no such breed as a cob, a cob being nothing in the world but an accidental production in crossing. He is a spirited little horse, but he is a squat, paunchy animal, which a wit said he could not dissociate from the idea of commonness and vulgarity. Cobs are admirably adapted for old gentlemen to ride—easily mounted and very quiet and very sure.

It is an interesting fact that the fastest two trotters of the day—Maud S. and Jay-Eye-See—are both lineal descendants of the illustrious sire and four-mile race horse, Boston.

Mr. Bowditch: As to horseshoeing, Nature undoubtedly intended the horse to go barefooted, and that theory is perfect, but practically it does not work quite as well on account of the hard roads and pavements, &c. I think the one rule to bear in mind in horseshoeing is that the frog of the horse's foot was made to be, to a certain extent, an elastic cushion, to take the jar from the horse's foot as he strikes the ground. Most of our farriers, when at work on a horse's foot, whittle the heel down as far as they can because it cuts easier than the toe, and they get it lower than the toe, and whittle out the sole, and at last, to bring the horse so that he can go at all, they put on a thick heeled shoe to bring him into any sort of bearing. My orders to my blacksmith are that the only part of the horse's foot that he owns is directly under where the shoe has to go. For a horse of decently pure gait and for ordinary purposes, such as working on a farm or riding, the lighter the shoe the better. All that is needed in the way of a shoe is something to protect the foot from chipping away while going over hard places and stones, &c. Probably many of you will disagree with me when I say that the average country road for a horse that is properly shod is harder on the horse's feet than pavements. In the city of London some years ago I saw a beautiful pair of horses that had been driven over the pavements merely with tips, and these answered all the purposes of a full shoe. With the ordinary treatment that the horses' feet get in the stable, which is being soaked and all that sort of thing, the sole gets so soft that a very short drive over a country road will act upon it like sandpaper and soon wear it away to the quick. If tips only are used, they should never be allowed to stay on longer than two weeks, for this reason—when you are using your horse, the foot of course growing everywhere equally, but the toe part being protected by the tip, the toe grows while the heel wears away.

Mr. Bronson: I tried the principle of tips, and I found that in New York it worked remarkably well. I drove a horse with tips two months, and he went very sure and never slipped, and it was very successful. But I took him to the country and he became very sore and lame, and I was convinced that he was, as it were, always traveling up hill, the toe being higher than the frog. But I believe by shoeing him as frequently as Mr. Bowditch had suggested I might have obviated that trouble.

Mr. Bowditch: With wooden floors in stables it is almost impossible to keep a horse's feet in good condition. For an ordinary horse that has nothing the matter with his feet I think there is nothing better than a cobblestone floor in a stall.

The "Farmers" then adjourned.

# The “New York Farmers”

AGAIN dined at the Hotel Brunswick on January 15th, 1885, LeGrand B. Cannon, Esq., presiding.

As soon as coffee had been served, Mr. Cannon said: It has been said by some very profound thinker, who was certainly a practical and intelligent observer, that the three substantial things which a man can get out of life are a good dinner, a good suit of clothes, and a comfortable bed to lie on. The subject of discussion this evening—“Sheep and Sheep Husbandry”—comes nearer to furnishing these great necessities of life than anything on the top of the earth. What more agreeable to the palate than mutton? What clothes our bodies more warmly than wool? What furnishes a more luxurious couch than a combination of wool and some other material? We have speakers present on all the questions arising in sheep husbandry, but following the order suggested in the statement I have referred to, I shall first introduce a gentleman who will treat on “Sheep for the Shambles”—Mr. Woods.

Mr. Woods: I do not hesitate to say that the average land of the Eastern States can be employed in sheep husbandry at a smaller expenditure for labor than in any other way. All the agricultural literature in England states that in that country sheep husbandry is the only profitable interest, whether in Lincolnshire, or in the south, or in the rich vales of the west. In England, they have been beaten down by the competition of American products from the Western States, and our land has been made valueless from the same cause. So, if the English farmer finds that the only way he can pay his rent is from sheep husbandry, may we not conclude that we can get the best pecuniary return from our land by the same means? The Western States do not send a single carcase of good mutton to England or to the New York markets. No carcase comes here from west of Kentucky, and it only comes from Kentucky in the Christmas season. Some good mutton is sent to our markets from Canada, and it pays duty and transportation, and still the farmer finds a profit in growing it. It is quite certain, however, that in spite of the exceptional advantages of Southern Ohio and Kentucky, we can produce just as good mutton here as they can. I have been in every county in England where sheep husbandry is an important interest, and I find that there, one man with an assistant—usually a boy under eighteen years of age—has the charge of

400 ewes and their produce, and takes care of them throughout the year. One cow is equivalent to 4 or 5 sheep, so 400 ewes represent 80 cows. What could one man do with 80 cows? But when the sheep have lambs there are then 800 or 900 animals in the flock, because the increase is reckoned at 125 per cent., and we have 900 sheep under one man and a boy. There is no reason why we should not do as well here. And the climate of America is better adapted to sheep husbandry than that of England. A sheep is altogether indifferent to temperature; he has a coat that protects him, and a healthy sheep that had plenty of food was never yet known to freeze to death. The one solitary condition required by the sheep is that he shall be kept dry, and in England it rains pretty nearly all the time, which makes it a much worse climate for the sheep than this. One of our great difficulties here is dogs. The dog seems to be the natural enemy of the sheep, but there is not one case in a hundred where sheep are killed by dogs in the daytime; the dog attacks them in the night or early morning. The thing to do then—which is exactly the thing people don't do—is to put the sheep in dog-proof enclosures. Purchase wire netting, No 15 wire, and six feet high, and run it around an enclosure of sufficient size for your flock, fastening it upon posts, and you have a dog-proof retreat. It is the instinct of the sheep to go every night to the same place to sleep, and after a few nights they will come to that enclosure of themselves. All you will have to do will be to shut the door, and when you open it again in the morning the sheep will themselves return to their pastures. If you are in a part of the country where stone walls have been in use, and you find trouble in preventing your sheep jumping over them, this may be remedied by running a single barbed wire along the top of the wall. Where we pasture our sheep these are the only expenditures necessary. For winter feeding, we must raise crops as for other animals. Cows cannot be kept on hay or hay and corn meal alone; they must have something that will loosen the bowels and cause a healthful condition of the system. For that purpose we must either purchase roots or raise or have ensilage. So with sheep, it is necessary to have roots, or the place of roots can be taken entirely by ensilage. The lambing season is a matter that requires close attention. But there is no other interest with animals where you can get skilled labor for so low a price as with sheep. England, Ireland and Scotland are full of shepherds who have been brought up to thoroughly understand the tending of sheep, and you can obtain them for the lowest reasonable wages. With one of these skillful men the trouble in the lambing season is just nothing at all. And now we come to that very important point—if we decide to engage in sheep husbandry, what especial line shall we have in view and engage in? Formerly the farmer found his greatest profit in keeping his sheep until they were three years old and sending them to the market as mature mutton. No one now, however, thinks of keeping a sheep longer than two years, and the majority send them to the market after one year, while the best farmers send them to market as lambs, finding in that way the most profitable return. I will even venture to say that in the Eastern States, where we are near large cities, the only profitable sheep husbandry will be in the production of

early market lambs. I recently saw Ottman and Bro. to find out the price of early market lambs, and Mr. Ottman said to me, "I will engage to take all the lambs you can send me during March and April that will dress thirty pounds to the carcase at $10 apiece." I find from weighing my lambs that I can always get a lamb that will weigh over sixty pounds and dress thirty pounds at an average of five weeks of age. So, if 100 ewes will produce, as my books show, 140 lambs, and in the months of March and April I can sell them at $10, I have $1,400 as the cash return from 100 ewes. Let me ask you here how you can get $1,400 from 20 cows? Putting in the wool at any price you please, it will at least pay for all the labor these sheep require. I will take care of a flock of sheep all the year round and raise all the turnips, swedes and mangolds they can eat during the winter for the wool. Oh, but you may say, you are putting your lambs in February and March whereas June is the usual time of sending lambs to market. That is so if you want to sell them at $5 apiece. But if you will have your lambs dropped on the 1st of February and if you have only an ordinary fold, you can have lambs ready in March and April as well as any other time. All a sheep requires is to be kept dry, and the lamb, after it is two weeks old, is just as indifferent to temperature relatively as its mother. All you need is a barn cellar, or if not that, a well constructed and light room fronting the south, with as large an area of glass on the southern exposure as you can have. I would just as soon have my ewes drop their lambs in the last week of January as at any other time, and I can attend to them better than in April. If you will use turnips, swedes, mangolds or ensilage, there is no trouble in raising the lambs, and there are more losses in April storms than in any ordinarily well constructed fold in January and February. I have been asked to state the diseases that sheep are liable to. All the books say that the diseases of sheep in America are few and of a low order; that is, they are not acute as compared with the diseases of sheep in England. The reason is that our climate is better suited to sheep, and we are free from acute inflammations and a hundred other troubles. Take that great difficulty of foot rot. They have it in England because the land is wet all the time. It rarely occurs on dry pasturage. Again, take the fluke in the liver. We know nothing about it in this country because it is a disease to which sheep are liable on wet and not on dry land. As to the scab and a lot of things of that sort, they are diseases of neglect; and no man who gives ordinary attention to his flock need have any fear of them. The use of carbolic acid and of soaps makes those difficulties of no importance whatever. There is more trouble from abortion in a herd of 100 cows than there will be in all the diseases of 500 sheep. To return to the main question—what shall we do to market lambs at $10 apiece? I won't say that this or that particular breed will do the business. You can purchase good strong native ewes brought from Ohio or Canada at $5 each in the Albany or Buffalo market. They are Cotswolds or Lincolns that have their full set of teeth, and then in the first of September you put with them a ram. What shall that ram be? You don't want any long wool sheep. It is absolutely necessary that you shall have a down sheep, that comes from the chalk of Southern England, of which there are four breeds—that exquisite beautiful paragon, the Southdown, his next neighbor, the Hampshire down, the Shropshire and one other. There are so many interests in breeding, however, that I don't wish to raise this question at length. In conclusion, let me say that there are many poetical considerations in connection with sheep husbandry. Here we are, in this nineteenth century, within twenty-five miles of New York, compelled to go back to the primitive occupation of man to find the most profitable use for our land! The circle of eternal change has brought men back in this, as in so many other things, to the point from which they originally set out.

Mr. Woodward, of the *Rural New Yorker*, was the next speaker. He said: I shall speak as a practical farmer, not as an editor, and shall endeavor to give you briefly my own experience in sheep growing, not in sheep breeding. The really primitive occupation of mankind was, in my opinion, the garden raising of fruits and flowers, and beginning with that, I soon found that man could not grow fruit alone, because the fruit required plenty of manure to make it grow, and I could not get manure out of fruit. I began experimenting to see where I could best get a supply of manure for my orchard. My first experiment was in feeding steers. I made that pay, and then started out in the feeding of cows, making butter, and that I made pay better. I bought cows, put them in the stable, and fed them on high pressure, giving them all they could eat and laying awake nights to find out how to make them eat more. I did not get fancy prices for the butter, but making beef out of the cows, the prices I got for the beef and butter together did and do pay me handsomely for the expenditure. By and by I struck out in feeding sheep—first with wethers, which I found a business that paid me better than the cows. Then I commenced to feed lambs going a year old, buying them in the markets of Buffalo or Chicago, feeding them in the winter and turning them off fat in the spring. Finally, I read a good deal about raising lambs for the early market, and I attempted that. I lost some money at first, but I persevered, and now I raise from 200 to 350 lambs every winter. My way of keeping sheep is entirely different from Mr. Woods. He gets them to utilize cheap land, but I keep sheep to turn the coarse products of my farm into manure, into mutton, into wool, and I do it on land that is every acre of it under tillage. I just do that business as a sort of a fill-in in the winter, and succeed in making a good lot of manure and some money, the manure being, however, the first consideration. I have tried the different breeds of coarse wool sheep; I have tried the downs for winter lamb raising; and as I fatten the ewe at the same time I raise the lamb, I cannot afford to pay the prices asked for those high bred sheep, and if I get mongrels I don't know what I am breeding, and so I fall back on using the Michigan ewes, that make splendid mothers, produce a nice lamb that matures early, and make good, fair mutton themselves, so that I can make the growth of the ewe pay all the expense of keeping her and leave the lamb entirely profit. I get those ewes about the middle of July. I like to buy them from the stock yards when they are almost starved to death, because I have found that by putting them in good feed they get in heat almost immediately, and a large per cent. will take the buck within the month of July. I have tried the different breeds of males, and my choice is between the Shropshire and the Southdown, but I cannot tell you, using both, which is the better. I get good results from both. There are some things that the Shropshire does that is an advantage. He gives them blacker legs and blacker faces, and the butchers will pay half a dollar more for a black face, even if it is on a Cotswold carcase. They buy by the legs and face and know nothing about the carcase. I keep them together until the first day of October, then the buck is taken from the ewes and put by himself. As soon as the first frost comes I put the sheep into barns, in pens eighteen feet square, twenty in a pen, and they never see the outside until they go to market. I have never had a sick sheep, except it was injured by accident. But in keeping sheep constantly in a barn thorough ventilation is very essential, so that the air can be kept pure and can be readily changed without draughts. I keep the temperature of these barns at from 50° to 55°. Another thing—the sheep in my barns are all shorn, for I find that by taking off the coat of wool and then high feeding them I can grow a nice coat of wool again by the time they are ready to go to market in the spring. So I feed sheep for three purposes, first to change the coarse foods of my farm and the rich foods I buy into manure, next to grow wool, next to grow mutton, and between the three I have never failed to make a good profit. In regard to the amount and kind of food I feed, I never restrict myself to any particular formula. But the food for sheep is corn unground, wet bran, new process oil meal and malt sprouts. Then I give them a daily ration of some green food. For the first part of the winter I feed the ordinary English turnip, which I can grow without appreciable expense except the cost of harvesting. I take some land that I have mowed, turn it over, put on plenty of fertilizer, sow the turnips, and that is the end of the trouble until they are ready to harvest. After about the middle of January or the first of February, depending a good deal on the season, when the turnips begin to get too far advanced to be in good feeding condition, I commence to feed mangolds, and I rely on those until the sheep and lambs are all gone to market, and I feed them all they can eat, commencing with a small quantity and gradually increasing it as they can eat and digest them. I find the more mangolds they eat, the more grain they eat and the more of the two they eat, the more profit they make, because the greater the growth. I concur with Mr. Woods as to lambing in the winter season. Since I have used the down breed of males I don't expect to lose one ewe in 300 in lambing, and when I feed plenty of succulent food there is no difficulty whatever. I started with the common notion that if you are going to raise lambs from ewes you must not, when you put them in the barn, grain them until after they have dropped their lambs; and so I let them live on hay and turnips, and my lambs would come in fair condition, but after that I had to commence and grain them gradually, for you must not begin too suddenly, and it takes several days to get them on their feed. Then I began feeding a little grain, and now I commence the day I get them in the barn with grain, and I gradually increase until I give them all they can eat, and I never have a ewe too fat to have a good lamb. The fatter the lamb, the quicker he will take care of himself and the less liability of loss of the ewe. About ten days after they are dropped, lambs will commence to look for food for themselves. Part of my barn is double decked and about that time I sort out some of my last spring's lambs and the dry ewes, and move them above and increase the capacity of the pens that are holding the ewes having lambs so as to give them about twice the room, and part of that is partitioned off with a fence that allows the lamb to pass through, but not the mother. In that little pen I have also a trough arrangement with the richest food that I know how to fix, so that the little fellow can eat all he can. I find, too, that the propensity to steal is not confined to the human family, and that lambs will prefer mangolds that they are compelled to steal to those put right before them. We therefore lay the mangolds a little outside the pen, and the little fellows delight to reach through and scoop them up with their teeth. That is, in short, about all there is in our process. One last word about sheep manure and its value. Its value depends exactly on the same elements that every other barn manure does, and that is the constituents that are in it. If you make sheep manure out of straw, it is not any better than so much straw, and the more good clover hay and good linseed meal and bran and malt sprouts you mix with it, the more liable it is to be good. I can go into the City of Lockport and buy a two-horse wagon load of manure for seventy-five cents, but I consider my manure as well worth several dollars as that is seventy-five cents. My manure is all made up of clover hay, some straw and rich feeding stuffs. The manure I buy is largely made up of shavings and the horse and cow droppings of the city. So that I consider if I feed the sheep and get the money back that I put in the feed, I should even at that be doing a very profitable business. My land, or at least the larger part of it, cost me $150 an acre, and I have to raise a crop on it every year enough to pay taxes and interest, and in order to grow wheat at a profit, when it is worth only ninety to ninety-five cents a bushel, a man has got to get more than ten or twelve bushels to the acre. And the only way to do that is to put plenty of manure on it. Indeed, the key to success is first, lots of manure, and next, lots of brains; and the manure is a great deal the easier to get.

Mr. Hayes then said: This subject of sheep husbandry is a very wide pasture and covers a vast extent. I shall simply speak to you on a very small branch of the subject—the merino combing wool industry. You all know that there are two ways of preparing wool for market. One is by carding, in which the fibres are thrown together in every which way in order to develop the fibre for felting purposes; and the other is called combing, in which all the fibres of the wool are placed parallel with each other. The process of carding was known from times immemorial. The Romans used the thistle to card, and hence, from the Latin word *carduus*, we have the term to "card" wool. Combing was also used from a very ancient period, for Chaucer, in the Canterbury Tales, written 500 years ago, says of the jolly frere:

> But he was like a maister or a pope,
> Of double worsted was his semicope.

So that the worsted was known in those days, and it was a fine fabric as distinguished from cloths.

Mr. Hayes then sketched the improvements in combing machinery until the introduction of the merino sheep into France in 1776, and the subsequent invention by D'Aubigny of the most beautiful of all textures—merino. Soon afterwards, the French discovered the art of weaving delaines and barèges and similar fabrics, and thus from the possession of the merino rose into commercial pre-eminence in that class of textile manufactures. He added: Up to about twenty years ago American manufacturers followed the example of England, and as late as 1865 there was not a pound of merino wool combed in this country, owing to our neglect of the better methods of France. In that year, having become acquainted with the real value of our merino wool, I said, in an address before the Wool Growers' Association, "the true value of the American merino is for combing purposes, for which it has a remarkable analogy with the merino of France. Our people will never know the inestimable treasure they have in their wools until they convert them to combing purposes and make the soft fabrics of cashmeres and merinos, which form the splendor of the industries of Paris, Rheims, &c." But that was mainly regarded as a mere suggestion of fancy, and a fleece of wool sent to me by Mr. Montgomery as a specimen of the Vermont wools, which were then universally complained of by the manufacturers, remained in my office for two years and the moths had got into it before a gentleman, in speaking to me of some beautiful fabrics he had seen at the Paris Exposition, asked if we had any of that wool in this country. "Why," said I, "that is merino wool; we have no end of it here," and I produced Mr. Montgomery's sample. Then the practical man brought the necessary machinery here, and in one year's time mill after mill adopted it. That was in 1869, and in 1876, at the Philadelphia Exhibition, I was delighted to see an enormous case of combing merino wools. Finally, in 1880, I found there was $10,000,000 worth of worsted yarns made of the fleece of the American merino in Philadelphia alone. See what the progress has been! In 1860 we had $1,600,000 of worsteds; in 1870, $22,000,000, and in 1880, $45,000,000. The fact that has contributed most to that progress has been the possession of the American merino, the development of which was a piece of absolutely unconscious work. The Vermont farmers persisted in breeding these sheep, because they found they could grow more wool to the fleece with them. All the time the manufacturers kept scolding them; but happily the farmers persisted, and in their own way developed the most valuable boon which agriculture has given to American manufactures. The fact of this possession now gives a new value and encouragement to our Eastern manufactories. The short wools will be grown in Texas and California and the East can grow these combing wools. The qualities required in combing and clothing wools are reversed. With a combing wool, soundness and length are the prime requisites, and then come softness and fineness; while with clothing wools fineness comes first, then softness, and lastly length and soundness. The comb tests the soundness of wool very thoroughly. The least burr, the least difference in the size, or the least weakness of the fibre makes it defective, and it breaks under the comb. Therefore soundness, strength and solidity of staple is the first quality necessary. And that comes from proper care of the sheep. I have examined with attention the reason for the excellence of our merino wool, and while I agree with Mr. Woods that we have the best climate in the world for sheep, I think the main reason is that conscientiousness and care which are such marked traits in the American farmer. An American farmer would starve himself and his children rather than his flock, and so the wool has no weak spot from defective feeding. In Australia, the enormous flocks often suffer from droughts and defective pasture, and in such years the fibre of the wool is unsound and weak; and so, in spite of their cheap labor, we shall always be able to hold our own against them. We have now in this country at least 51,000,000 sheep and raise annually 350,000,000 pounds of wool, and more than three-fourths of our sheep are either merino or merino grades. This accounts for the steady cheapening of clothing. Recently, in a clothier's shop, I found that a workman can now get a Sunday suit, a working suit and a great coat for $24, all of good, sound material, so that he can in a fortnight earn enough to clothe himself for a year. Contrast this with the condition of things in former times! At the time of the Revolution wool in Philadelphia was worth seven shillings a pound, and it is said there was not wool enough in all New England to make a pair of stockings for each inhabitant. The Assembly of Pennsylvania passed a resolution that the butchers should not kill any mutton, and when Paul Jones made his first capture and got 10,000 uniforms, it was hailed throughout the country as a great blessing. In 1800 the people in Rhode Island were so badly clad that half grown girls went nearly naked and hid themselves when strangers came up. Now, one mill uses up the fleeces of 10,000 sheep a week, and a clothier recently told me that from his store he could immediately clothe 100,000 persons. But our merino sheep, with all its excellencies, needs improvement. We want a finer wool; we want finer dress goods; and, above all, we want to make a change in the merino, so as to convert him into more of a mutton sheep. I believe that is possible, for experiments made in France show that the merino is capable of being changed into a mutton animal equal to the down. There is a prejudice that the merino is not good for mutton, but Mr. Winter, an Australian, told me that, owning 50,000 sheep of both kinds, his experience was that the best mutton was the merino. That our merino is not so now I will admit, but it is capable of development; and it is a fortunate fact that this can be done consistently with the future of our manufactures. It has been shown that when you increase the fattening of a sheep you don't increase the bulk and the size of the fibre. The form of the fibre of the wool is determined by the aperture or hole through which that wool issues, and that has a determinate form, and the effect of increasing their fattening aptitude and giving them increased development is to make more wool, not to increase the size of the wool. Therefore you get a larger fleece with a larger number of fibres, and you get an animal better adapted to mutton and better adapted for the purposes of manufacturing.

The Hon. Wm. M. Evarts closed the discussion with a few humorous remarks. He said his first investment or experiment in sheep husbandry was a somewhat expensive one. It cost him a great deal of time, labor and study and a great deal of money; and he had nothing to show for it at the end except a sheep——skin. Still from that investment in a sheep skin, he thought he had made more than an ordinary return in reduplication year after year during a considerable period; and he was therefore in favor of sheep industry. At the outset, he found that there was one of our professions whose members we were told on the highest authority were sent out as sheep among wolves. That was a form of sheep industry, for which he had no inclination; and he then found there were two other professions open to his choice whose members might fairly be considered as going into the world like wolves among sheep. He referred to Dr. Agnew's profession and his own; and while his own profession went for the fleece, the Doctor's went more directly for the mutton. Mr. Evarts gave at length his experiences in regard to the natural antipathy between sheep and dogs, and concluded by expressing a hope that he might some day have the honor of becoming a member of the Society.

The Farmers then adjourned.

# The “New York Farmers”

AGAIN met at the Hotel Brunswick on February 19th, 1885, Le Grand B. Cannon, Esq., presiding.

In opening the evening's discussion, Mr. Cannon said: The subject selected for consideration, “Grape culture and American wines” may perhaps hardly be within the range of the average New York farmer, yet, as an American industry, it is developing so rapidly as to be well worth his attention. At the last dinner, we became quite satisfied that the best economic use for our pastures and hillsides was sheep husbandry; and after listening to the practical and scientific gentlemen who will address you this evening, we may possibly find that we may devote with equal profit our slopes, terraces, and perhaps even our ledges, to the culture of the grape. Statistics show that our importation of wines in 1870 was 5,000,000 gallons and the domestic production for the same year less than 4,000,000 gallons; while in 1884, our importations were still only 5,000,000 and the domestic production 28,500,000 gallons, showing that the entire increased consumption of the United States in a period of fourteen years was supplied from American wines, and that that increase has been over 400 per cent. Less than twenty per cent. of the consumption of wines in the United States is at present foreign. These figures indicate to some extent the rapid development of this industry. It is stated furthermore that in California the annual increase of acreage in wines is above 30,000 acres. It may be bold to declare here that this is to be the great wine making country of the world, not only in quantity but in quality, but I believe that this industry will develop like every other industry to which American mind and talent and skill have been devoted and that we shall not only equal but excel older rivals.

Mr. F. W. Lüttgen then submitted the following paper: Careful study in a mercantile sense, of the California wine industry during a period of ten years, and between a visit to the Pacific Coast at the commencement of this period and a recent visit, has not only recognized great improvements in the wines as they reach this market, but a great improvement on the Pacific Coast in the cultivation of the grape and the care of the wine, of which the improved wines in our market are but a natural consequence.

The greater progress has been made during the past five years, and this is largely due to the labors of the California State Viticultural Association. This association not only holds annual meetings at San Francisco, the central market for the products of all the California wine districts, but in each wine district, as well. At these sessions vineyardists state the results of their experiments or tests for the general welfare and appear to have only the general interest. of the State at heart. It is to be regretted that the same cannot be said of the dealers or distributors of the product of the labor of these vineyardists. Among the dealers much rivalry to realize exists, to the injury of good wines, or in other words in their endeavors to find a market.

In recognizing the progress which has been made the question naturally arises: What is being done toward further improvements?

There is a prevailing impression that California will not be able to produce a wine rivaling favorite wines of Europe, until California vineyards shall have been cultivated a similar length of time. This popularly accepted theory close observation of facts largely disproves. Of the old vineyards in the world but comparatively few produce wines of renowned quality and in these we find differences of quality in different vintages.

Quality in the wine is therefore more the result of the original nature of the soil, climate, and variety of grape, but more particularly of the care and treatment during fermentation, construction of cellars, and age of the wine. Experience has proved that California may attain the best results to almost a degree of perfection within the next five years.

The period of fermentation is undoubtedly the most critical period in the production of a good wine. It matters little how fine the grape may be, how suitable the soil, how perfect the climate, improper fermentation will counteract all.

Many cellars of the vineyards of California are yet very crude in many cases, mere sheds above ground on the slope of a hill, structures entirely unsuited for that equalization of temperature so important during the period of fermentation. Attention to the faults yet existing at some of the vineyards brings to notice advancement in others, so these faults exist only by contrast, representing the first stages of the wine industry.

In California some of the smaller vineyards produce the best wines. This cannot be because the grapes grow better on smaller vineyards but must be attributed to better control over temperature of cellar. The summer heat is lowered by the use of the water hose and the wine being fermented in smaller tanks generates less heat. A certain bitter or rank taste found at times in some wines of the finer grapes is less the result of soil than a too high temperature at the period of fermentation. Improvements in the fermenting vats will largely help the quality of the wines of California.

The present general practice in placing California wines upon the market is very reprehensible, the San Francisco jobber destroying the finer results of individual vineyards by blending these superior wines with the ordinary to form a uniform staple article.

If the San Francisco jobber were to place California wines upon the market separately, as to this or that vineyard, or in the case of smaller vineyards and absence of special distinguishing character as to this or that section, the reputation of California wines would gain rapidly, for the finer wines would not be lost in blending.

The discriminating taste of eastern consumers is underestimated by California wine merchants.

The first and a very important step in the production of champagne is the blending of some half a dozen carefully selected different wines, in which both the white and black grapes are represented; the grapes from which champagne is produced in California are all grown north of San Francisco, in the districts of Sacramento, Yolo, Eldorado, Napa and C. The grapes are all of European approved varieties and the same grapes have not produced satisfactory results in counties further south.

The general improvement in California wines is also due to the abandonment of the Mission grape, a coarse grape, the cultivation of European varieties and locating vineyards at the foot hills.

The wines for champagnes are brought to the San Francisco cellars before they are six months old. They usually arrive there in a muddy state very much resembling thin chocolate and it is in this state that their future qualities must be prejudged, or the champagne is produced at the risk of heavy loss in case of failure.

These wines are then allowed to rest and to settle their impurities. After this the operation of blending is commenced and herein lies the secret of making any good champagne.

In bottling this blended wine nothing is added to it to produce the sparkle, that generating itself by fermentation in the bottle from the natural sugar remaining undecomposed in the wine and which nature had placed in the juice of the grape. It is in this that California claims superiority over every other champagne in the world. In France rock-candy and alcohol are added at the time of bottling.

After bottling, the champagne is placed in a fermenting room of 70° Farenheit for a short period when it is removed to cool cellars and remains undisturbed for two years or more. It is then placed upon racks and when clear disgorged, the addition of syrup, made from rock-candy and white wine is then added. Contrary to the syrups used in Europe, the California champagne syrups, have no alcohol or flavoring whatever added.

The syrup does not become thoroughly incorporated with the wine under six to twelve months.

There are at present over three thousand grape growers in the State of California. The production in 1884, was upward of 15,000,000 gallons, and official returns will probably make it nearer seventeen millions. The crop of 1885, is estimated to be twenty to twenty-five millions gallons. An annual increase of five millions of gallons is only a moderate estimate, and it may be safely estimated that 20,000 acres of new vineyards are annually added, such attention is at present devoted to the cultivation of the grape in the State of California.

Mr. Reemelin of Cincinnati, after being introduced by the President, remarked, that he must confess to some surprise on receiving the invitation to address this club, because it seemed entirely out of the usual order of things for Eastern societies to invite Western men. Usually it is the West that sends for speakers to the East. He accepted the call in the hope that those who were generous enough to invite him would also be lenient enough if his remarks failed to come up to their expectations.

Mr. R. then continued: I wish to engage at once your full attention to our subject, and therefore start by laying down a proposition that brings up the points involved on all sides. It is one that you will agree to, but you will do so, each of you, for a different reason. That may appear paradoxical, and so it is, for you yourselves are part of the paradox. The proposition is: *That American society stands in false relations to grape culture and its product, wine.* What I have to say is intended to act as a rectification of some of these false relations. You will perhaps deny the latter part of the proposition and feel disposed to argue it, but I cannot now stop to argue it with you. I can only say that if, when I am done, you are not satisfied with the position assigned to you, it will be time enough to enter into a personal argument. Please now to cast your mind over American society, and marshal before you its various elements as to this question. It contains teetotalers, moderate temperance men, then the friends of wine, beer and whisky, not to forget cordials, then reflect on the variety of opinions as to legislation, police and family regulation, and forget not that as to the latter there are in each family as many opinions as there are members of it. Aud then consider that this diversity extends to the treatment of the vine, and did so from the beginning. Reflect, then, that it is not so elsewhere, for the other nations are in settled conditions on all these subjects; they are either pre-eminently whiskey, wine or beer consumers or not; and their laws are now and have been for some time definitely fixed, and the powers of the police, as well as their exercise, vary only in pursuance of well understood policies, which nobody proposes to unsettle or to abolish.

The same is true as to grape culture and as to wine making. Why is there *permanency there?* Why unsettledness *here?*

The primary cause is easy to find. It consists in the mixed make up of our people; each bringing with them what to them are time honored habits and moralities, which are, nevertheless, questioned here not only individually but in church and State also. And yet, what perplexes the matter still more, is the fact that no one of these nationalities adhere entirely to its home habits, but is enamoured also with manners and customs adopted here as modified in pursuance of the respective experiences, and as social positions and ideas are picked up here. We all see this variance, but we do not all understand it. The history of grape culture and wine making illustrates it better than that of anything else, and I allow myself to use it before you for the purpose of a double insight into the matter. The wishes for grapes and wine—as American product—started in this country from more or less vivid memories. The enjoyment of both was an universally admitted desideratum, and none doubted but what the greater part of the United States territory was suitable for vineyards. There was also an abiding faith that there would be among the native grapes some variety of extraordinary excellence. And the idea naturally grew up that as everything was expanding in America, that the same thing would occur here as to grapes and wine. Large farms was the rule then in a much more extensive sense than now. Where we count by hundreds of acres they then counted by thousands; and *mammoth vineyards* was the logic of the then situation, coupled with the idea that American wine, and it superior to any other, would be made in sufficient quantities to supply the whole world. And we may as well admit that this century began under very favorable auspices for this idea, and the resultants it led to.

Many Swiss, German, French and Spanish colonists had made beginnings in vineyards and wine making, and news of their successes during the earlier years had spread over the Union, and were credited with all the magnifications added to the news as they traveled. The large product of some one of the grape raisers became the basis of all kinds of anticipations; it became the standard for all calculations, and soon it a was reproach not to start a vineyard. Such a man was declared to be behind the age, which was about the hardest accusation that could be made against him. There was, of course, much that was misleading in this matter, because the popular mind was but too apt to forget inquiries into the most important points. The news of large yields traveled much faster than knowledge as to planting and cultivating vines. It was generally asserted that no special knowledge was necessary, for the successful men had, we were told, simply followed their native common sense. Nevertheless, some did inquire and periodicals published some. Even books were written on the best methods. These, however, run against the popular grain, because they contended for examinations into the soil and the exposure as well as climate and accuracies in all the details, which everybody believed at once not to be proper for America. All said: Surely we have no such exactness as to our other crops; why should it be necessary for vineyards? So the suggestion came, like angels whispering through the air, that the great superiority of American agriculture and horticulture consisted in cultivating larger areas than was the case in Eurpoe, and in using new methods, labor-saving tools and less hide-bound processes. And applying these suggestions to vineyards the outcome was, that instead of planting one acre that would have cost $500 by the time it would bear a full crop of grapes, it was determined to have ten acres set out for the same money. This meant vineyards, by having the land ploughed up and the grape slips put in by drills, and *all in a hurry*.

The approved standard would have required spading up three feet deep, with thorough sub-drainage and the slips to be set out only after they were previously tested. And so too would all the culture have to be carried on upon approved methods involving both more money and more industry and skill than was accessible then, if large, so-called "Mammoth Vineyards" were persisted in. I cannot go into greater detail. It must suffice to state that Mammoth Vineyards were persisted in. That for a while, though many grapes failed to grow, the premises and presumptions on which they were set out and worked, seemed correct; for the yield was at first great. But after the fifth bearing year, certainly by the tenth, the delusion ended with small or no crops and soon grape culture was, in such cases, abandoned in disgust. In the township where I live, we rapidly run up, on the first run, into hundreds of acres of vineyards. But after ten years' experience—by 1850—we began to doubt our own precociousness and by 1870 we had fallen from the hundreds into the teens as to the number of acres, and three-fourths of our vine dressers began to tear out their vines. To-day, of some two hundred vine dressers, but one is left that has over two acres.

You will perhaps say to me, that even with the greatest care and the most generous outlay there would have been a failure. This I deny, because I have the proof in my own homestead. The only piece of vineyard, about one-half acre, which I have now in successful operation, is the half acre, which I trenched and planted at the outset and very near up to the standard. And I have no doubt, that if I had complied fully with the standard rules, for all my nine acres, the yield would have been satisfactory all the time—forty years in all. Now mind! I do not say that it would ever have paid me to have put in and kept up ten acres of vineyard on the standard or any other plan. On the contrary, I am convinced that ten acres were in themselves, as things go in America, disproportioned to my general farm economy and family life. It would have entailed not only the expense of a half a dozen hired men, ycleped vine dressers, but there would have been an almost unbearable difficulty in our domestic service. This would have been even worse than the difficulties now about to be reformed in our civil service. Large vineyards necessitate the employment of a disproportioned number of hired men of a class that asked not only high wages, but required a treatment as to food and lodgment that multiplied work on the female portion of our household to an insufferable degree. Whilst a half acre could easily be brought within the regular farm economy, this was impossible with ten acres. And the disparity in labor and cost necessitated, that all calculations should be made with a view to selling grapes and wine in large quantities in market, which again changed the whole course of farm economy and made us all feel insecure.

This brings us necessarily to the discussion of what I call "*commercial farming*" as contra-distinguished from "household farming." The first named may be proper now in America, as to crops like cotton, cane-sugar, rice and orange groves. It was once in vogue as to cattle, corn, wheat oats and barley, but we all know, that while it lasted it was not conducive to high civilization here. And we, who have abandoned that sort of farming life, know, that we are better off than formerly. We have learned also, that no commercial farming is feasible with climatic and soil conditions by which there is a failure of crop by frosts or diseases one year out of three. That is the case under even favorable conditions as to vintages. An owner of a disproportionate large number of acres in vineyards has therefore a very precarious existence and that fact acts on his character. He loses some of the better qualities of the farmer and acquires the worse habits of the speculator. In brief, it is farm gambling and not farm economy to make vineyards the sole or even the main dependence of a family. In the greater portion of America grape crops are nipped by frosts and diseases as well as insects once in three years, a fact that forbids grape culture being more than one fiftieth of the general farm work.

Had mammoth vineyards been promptly discarded thirty-five years ago, and with it the other twin idea, that every piece of American land may be turned into a vineyard, and we should have been saved much bitter experience. The true policy and the best one would have been to have fixed the mind of all on the principle that no farm or garden in America should be without some grape culture; but *it* should always be proportionate to the other labor and economies in each respective household, consulting in this regard specially the domestic service. *It is* the weak point in American society any way and it can't bear straining. Then we would by this time have had quite different experiences from those we have had. There would have been no sweeping disasters and abandonments, but in their stead many persistent pursuits in this branch of culture, most of whom would have been instances gratifying to our feelings in many ways, and even conducive to our pride as a nation. American society would be in much fewer false relations to grape culture and its product wine, and instead of being a paradox to the world and ourselves on the various points involved, we would have had greater comfort in our entire livings.

And I am happy to be able to state to you to-night that movements in this direction, all, indeed, on individual spontaneity, are now in progress. There are, perhaps, but few vineyards now being planted, but the more trellis work is going up. I notice it everywhere in my travels. And it does me good to be able to say to-night that at this work much sound experience is gathered, new varieties of grapes are being established; and while the progress is slow, it is constant, and has few, if any, relapses. Every trellis I ever erected was always productive and is still useful. Frosts, spring frosts are, indeed, our great foes here, too, but not oftener than once in five years, and then there is never an entire failure, as is much more frequently the case in vineyards. Let me then urge upon you to hold aloft the flag for a universal adoption of grape culture on every farm and in every garden with a gradual steady extension, as knowledge spreads, in variety of culture, including vineyard planting. And soon America will find that it may yet be a good wine growing country with great benefits for all its people.

And now I must say that, as to wine making, the errors and mistakes pointed out as to vineyards were continued in the treatment of wine from the press to the cellar. It was assumed that American wine was, as a matter of course, better than European wine. Everybody who wanted to be popular had to back this assumption. Thus the wine question was made one of popularity and partisan patriotism, whilst it ought to have been one of strictly right technical science and practice. In nothing has knowledge and skill progressed in Europe to more definite conclusions than as to the ripeness of grapes preparatory to picking them for the mashing machines, the press, the casks and the fermentation, including, of course, also the proper temperature in the cellar and the use of meters for ascertaining the strength of the must. We, in America, have gone largely blindly ahead. We were careless as to ripeness; did not separate the bad berries carefully from the good, and mashed and pressed all together with an inexcusable indifference. In the cellar we followed no scientific routine; in short, we made a much poorer wine than we really should have done. So we ended in a wine which, I think, it took much more patriotism to drink it, than sensible people could muster.

Ludicrous scenes often occurred where zealous candidates for office visited wine growers. They were, of course, treated to Catawba, and had to swallow a glass or two, with its usual free acidity, with as smooth faces as they could put on. They would praise it, while in reality they felt like giving it bad names. I, in standing by, often thought of the story they tell of *Prince Eugene of Savoy.* He, on coming home, passed through the town of Reutlingen, and there was presented to him, at the City Hall, a cup brimfull of the wine that was made near that town. He, brave in every attack, emptied the cup at a dash, whereupon they offered him a second cup. But he pushed it back with the remark, "No! No! Excuse me! I would rather take the fortress of Belgrad again than another cup of this, your wine." Our candidates in the West had a similar dislike to Catawba, but they lacked the high toned pluck of Prince Eugene, the conqueror of Belgrad, to speak their mind openly.

And now one word as to the free tartaric acid in American wines. In Europe tartaric acid combines with alcohol and forms oenanth aether, whereby it gets what is called *die Blume*, and that taste so agreeable and healthful to the stomach. Why the acid *here* refuses to amalgamate with alcohol or alcohol refuses to amalgamate with the acid, I cannot tell. Nor has the reason been found to my knowledge. But in this fact lies the problem whether our wines shall have a great future? To its solution all our energies should be bent. The defect—if defect any natural divergence may be called—lies, in my opinion, in climatic influences on the vine and its fruit before vintage. We have in Ohio forty-four inches of rainfall in a year, and much of it pours down upon the vines while they are in tender conditions, as, for instance, during blooming. The foliage of the grape speaks to us on this subject by the way the leaves hang. They seem to be averse to rain water, while corn—the master crop of America—indicates the reverse. Whether it is possible to remove this injury from excessive rain to our grapes is an open question. Some improvement is doubtless possible through summer trim and special ways of tying up the vine. So may we change the soil by making it more porous and less liable to hold moisture, as water; but, after all, climatic causes are hard to counteract, and generally the remedy is too expensive. We must therefore, as I think, see whether we may not effect some relief *after* the grapes are cut from the vines.

If I may venture on a suggestion, I would say, that a remedy will most likely be found, if we will use mashing machines that crush the skins of the *berries* more thoroughly than is now done. I make this suggestion, because I have in part tested it and found it correct to some extent. Whenever I passed the grape pomace twice through the masher there was less offensive acid in the wine than when I passed them through but once. Two years ago I repeated the mashing a third time and made a wine which everybody, myself included, liked, because the tartaric acid obtruded much less than usual. In dry seasons the difficulty is much less than in wet seasons, which looks as if the thinner the skins of the berries are the better and more thorough is the fermentation, in other words the completer the entire product. And in this connection I must mention the great benefit I have derived in my vineyard from the use of coal ashes when put around the roots of the vines. I came to make the experiment twelve years ago because I observed on riding up to Mount Vesuvius that there excellent vines were growing, with plenty of healthy grapes, in the midst of the lava and cinders thrown up by the volcano. I surmised that there was not much difference in substance for vineyard purposes between the material cast out by Vesuvius and our coal ashes. I tried the experiment and it was a grand success. It loosened, as I reason, my clay soil, that holds water like a bottle, mechanically, and supplied besides elements of soil, in which the phyloxera can't prosper. At any rate there is since no standing water in my small vineyard, even after severe rains, and I have no more phyloxera. I have recommended it to others, and all that have used it had beneficial effects from it. The method does not indeed suit every soil, nor does it apply to all coal ashes. Those I used came from bituminous coal burned to whitish grey ashes, that assimilated with the soil.

Please follow me now in a few general remarks explanatory why I am so enthusiastic for a general diffusion of grape culture in small parcels and proportionate to our economies. It is because from early life up, much of which was spent about vineyards and with expert vine dressers, I have noticed that work about vines instigates to intelligence and economy as well as scientific technical wisdom. A vine dresser can't remain a mere clodhopper. The vine is an unforgiving plant, it punishes every misdeed and negligence; and yet it is the most submissive to restraint and accurate disciplinary treatment. It hates bunglers; it wants the correctest treatment. I have learned its language and know it to say: "All work has to be done for a good reason and exactly carried out or else wrong results are caused." I regard grape culture as the first success and crowning glory of man's rule over vegetation. When man first said to himself: "I will bend this twig and have larger berries;" or, "I will reduce the number of bearing buds and improve the quality of my vine by shortening the branches;" or, "I will have less quantity of wine but better quality by summer trim;" or, "this wood shall be bearing wood next year, and this in two years and there it shall grow in three," he asserted man's freedom of will much more conclusively than theologians do by their sermons. And he had a right to be a little proud, for he had enhanced his own existence and that of all around him.

Then, in all his acts, he imposed his will on nature and became its master, and every time man did this he must have felt that he is a superior being, because a co-operator in God's handiwork. He was therefore on the ladder that leads upward in the scale of knowledge and civilization. Take these remarks, ponder on them, extend them and you will not only excuse my enthusiasm, but understand it, which is much better for us all. One word more. I am the man who said, in the Constitutional Convention of Ohio, that "I hoped the time would come when every family in the land would sit down to their dinner with a bottle of wine on the table." And I added, "Then will civilization in full exist in America." I did not mean to ascribe any miraculous civilizatory power to wine. My object was, as just explained to you, to set in flow a movement for grape culture and for wine making that would in its effects on human character add to our people greater intelligence, more virtue and higher wisdom.

In conclusion, allow me to remind you that in Germany they are doing a vast amount of good to agriculture and horticulture through what they call *Wanderlehrer*. They go over the whole country and spread, by conversation and practical demonstrations in all kinds of farming and gardening operations, an immense quantity of information. Your club should examine into this institution and establish one like it here. Especially should you organize a troop of *Wanderlehrer* for the dissemination of practical knowledge as to grape culture and wine making. The cost would be light, whilst the advantages would be very great. In Germany in one single State—Brunswick—the benefits have exceeded the cost thousand-fold, as you will find on inquiry. Do then, I beg it of you, take this into consideration and "unborn generations shall call you blessed."

Professor Collier, (of Washington): We have not begun as yet to test the full capabilities of our soil and climate, and it would certainly be a bold prediction to declare in advance that we shall not find certain slopes, certain exposures, where varieties of grapes equalling any of the choicer sorts grown in Europe may be successfully cultivated. In the winter of '77-78, I was called to take charge of the chemical division of the Bureau of Agriculture and my attention was directed to this rapidly growing interest. It seemed to me that the resources of the laboratory could properly and profitably be turned to the analysis of the products of our vineyards. Your President has referred to the wonderful development of this industry. In 1840, the wine imported was 97½ per cent. of the entire consumption; in 1880 it was only 17⅘ths of the entire consumption. Yet even now, the bulk of the wine imported would be three times the bulk of the Washington monument, and put into casks, it would make a string of casks continuous from Washington to Boston. I sent out letters to all the prominent wine growers offering to analyse their products. Everyone responded with alacrity, and many gave me *carte blanche* to go into the market and buy any brands of their wines I might find for sale. In all justice, too, I must say that I found no greater differences between samples sent me and those purchased in warehouses and groceries than might be fairly attributed to lack of proper handling after leaving the manufactories. I had wines from eleven States, from thirty different manufactories, in all 184 samples. They consisted of seventy-one red wines, fifty-two white wines, fifteen champagnes, three brandies, and forty-three sweet wines, such as ports, sherries, Angelicas and Muscatels. As I understand it, a wine is not a fair honest wine, if it has had alcohol or sugar added to it; and yet, if that were done intelligently, I think, the addition might sometimes be a desirable thing. Grape juice is mainly a solution of sugar in water, containing some nitrogenous matters, some tartaric acid, and a little tannic acid which it may take from the skin or seed in fermentation. But so far as wine making is concerned, it is a saccharine solution with a little tartaric acid and of course some salts—notably potash. The crushed grape speedily enters into fermentation. I entirely agree with the statement that this hasty fermentation is almost invariably disastrous in its results—especially in causing lack of bouquet and in destroying the keeping qualities of the wine. Sometimes to add to the coloring matter in red wines solutions of elderberry juice or some highly colored fruit are used, but we have very rarely found anything of the kind in the 180 samples examined. In the alcohol, a bi-tartrate of potash is precipitated, and that constitutes the lees of the wine cask. Most of it comes down before it is racked off into barrels. The object of racking is to prevent the fermentation from being completed in the open air. Here is a point in which, as they themselves acknowledge, our work has been helpful to the manufacturers. They allowed it to remain so long that it entered into acetic fermentation, and there was an undue amount of acetic acid developed, which when in excess, constituted a sour wine. But if the air is excluded—and we recommended methods by which it might be—this is impossible, though the fermentation will go on until the normal grape juice with all the sugar has been converted into alcohol. The alcohol is practically in fermented juice fifty per cent. of the amount of sugar. We have then a method of trial as to the fortification of a wine. Analyses made by Prof. Moore at the University of California of eight musts or grape juices showed the presence of 19.33 of sugar as the average. The famous Johannisberger must, according to Fersenius, contains 19.2. Wines made from those eight juices could not have contained an average of over nine per cent. of alcohol, but you will almost invariably find a little more which may be honestly present, if the wine has been kept in casks, because, as is well known to you, the water will more rapidly evaporate and a wine which normally was 11.5 might have a content possibly of thirteen, through loss of water. Among these sweet wines were some that must have been made from a juice that was half sugar, they contained so large an amount of free sugar and of alcohol, but undoubtedly the sugar had been added. The average of the sixty clarets which I analysed gave 11.4 of alcohol, and of the fifty white wines 11.71. These were all thoroughly dry wines: they did not average one-tenth of one per cent. of sugar in them, and were such as might be fairly produced from native grapes by the ordinary processes. They contained nothing that gave any evidence that they had been tampered with. The amount of free acid in a few cases was abnormally large and we gave directions how to correct that, but as a general thing, the amount of acetic acid showing the fermentation to have progressed further than was desirable was exceedingly small.

Mr. Chauncey M. Depew, after referring humorously to the contrast between the ordinary pursuits of the gentlemen present and those of the ordinary farmer, said: I have come to the conclusion that you sacrifice yourselves for the benefit of your kind. All things which produce any results in this world that lead to the elevation of the masses are expensive—and reformers die, the followers who come after alone reaping the fruit of their efforts. A gentleman who has accumulated a fortune in some pursuit with which he is familiar, and who goes out and becomes a gentleman farmer, is in every sense a benefactor of his race. He adopts all the new theories which are afloat, and while in the immediate result there is an enormous expenditure and waste, there is generally some good which percolates through the community. Personally, I look upon your efforts as possibly productive of greater good than you yourselves contemplate. The most serious problem which is now agitating the country, far outgrowing socialism or communism or any of those dynamitish things which affright property-holders and investors, is—what is to become of the element which constitutes the bone and sinew of the country and upon which we must rely for good government and the best future of our country? As the populations of the older States increase, as the price of land advances and its quality deteriorates, so does the product of the West, grown upon virgin soil which cost nothing and is burdened with no taxation and which transportation brings into competition with these nearer farms, tend to destroy and wipe out the farmer of the Middle State, of the nearer Western State. It has already wiped out absolutely the farmers of most of the Eastern States, and if it should succeed in wiping out the farmer of the Middle States, results would follow far more disastrous than anything else that has yet occurred. It is easy to be seen that this thing should be regulated by the farmer himself—by rotation of crops or something of that sort. But he is usually a man without any very large or broad views, or intelligence, or education or capital. He has usually a mortgage on his farm and no money, and somebody else must test by experiment what it is best for him to substitute for his old products. Precisely that you can do with your experiments upon your fancy farmyards. It makes no difference to you if your milk costs you more than your champagne, or cabbages $5 a head, or beans a dollar a quart, if, in the result, you develop that the farmer can do something by which he can sustain his independence and maintain his farm and keep alive the agriculture of the East. We are frequently told that Cincinnatus is the proper model for any man who wants long life and a virtuous inheritance to leave behind him, and that agriculture is the one thing upon which rests the prosperity, the glory and the growth of this Republic. Looking around me, I am convinced that the statement is indeed true. But as to the subject of this evening, we are not a wine drinking people, and notwithstanding all that has been said I do not think we ever shall be. There is something in the elasticity and life and vigor of our atmosphere which will prevent the general run of our people from being a wine drinking or bibulous community. We who are exhausting our nerve and brain tissues in the City of New York, in these violent and fierce competitions of business or corporate or professional life, need to "brace up" by every social opportunity, but in the great world about us of the workers who do not worry, and who can sleep twelve hours a day, we shall never find a great substratum of population who will substitute wine for water.

The "Farmers" then adjourned.

# The “New York Farmers”

AGAIN met at the Hotel Brunswick on the evening of March 19th, 1885, LeGrand B. Cannon, Esq., presiding.

In opening the debate of the evening, the subject selected being "Fish Culture," Mr. Cannon said: No doubt we all agree that a very considerable factor in the value of a farm is its water supply, but perhaps most of us have not considered how that water supply can be utilized further than by giving drink for the animals or water for domestic comforts. But we are all aware that the superficies of water affords more food than the same amount of the soil, a fact which, I think, can be readily accounted for. The soil has a depth varying from two or three inches to two or three feet, while water may have its foot or fifty feet. So the added amount of food possible furnished by water comes from its depth. Be that as it may, it is a very important economy in agricultural life to avail ourselves of all the elements of wealth on our farm, and if we have the fortune to possess on it a fine running stream of water which nature had originally stocked with fish, but which is now depopulated, it is important for us to ascertain how this waste has occurred and how it may be remedied.

Mr. Cannon then introduced Mr. R. B. Roosevelt, who said: In speaking on the subject of fish culture the great difficulty I experience is to know what to omit, how much not to say; but I take it for granted you do not wish me to enter into details, but only to tell you what has been done and can be done, and how the subject affects farmers in the practical way of adding to their income or their comforts. There is no body of men who have a more immediate interest in the improvement and increase of our fish supply. The farmers own the land which surrounds the waters in which the fish live or in which they ought to live, for there is no stream or pond, river or lake but could be made to yield far more than the trouble of its cultivation, in a way, too, that is best appreciated by a community where a fish diet is often hard to obtain. When the New York Fishery Commission was created, in the year 1868, fish culture was in its infancy, and no little uncertainty existed whether the results would confirm the expectations of sanguine fish culturists. But all doubts have been removed, and the most skeptical have been convinced that even in our present imperfect knowledge of the art and with an immense deal yet to be discovered, the benefits have almost been as miraculous as the famous draught of fishes. It has turned out that in planting fish we can work with as firm confidence and assured results as in planting corn. The yield is dependent on the skill and care and suitability of soil and intelligence of management in a measure, but in a far less measure than with the products of the land. In putting in a crop of corn, which is the most profitable of all American cereals, you put in at least six seeds to the hill, as the old distich says—"one for the cut worm, one for the crow, one to go to rot and three to grow." If you realize four ears on your three stalks you will do as well as the average, or at most five hundred kernels for one. That is farming or earth culture, and after four thousand, or possibly four hundred thousand, years of study and struggle with the hardest of toil in the sun of summer, and when the sweat runs down a man's face, as the Holy Word predicted bread winning would always require, after the arduous handling of manure in all the older countries and worn out soils, after the preparatory ploughing, the marking out of rows, the dropping and covering of the seed, the two or three workings by the plough, the two hoeings, and then the cutting and carrying off and husking and shucking till the final shelling gives the hard earned, golden reward to the tired husbandman, why the profit hardly pays for the outlay and fifty cents a day for labor, and unless the farm is free from mortgage there is little, if anything, left of profit. If that is the best the New York farmer can expect may he not fairly strive for every means of bettering his lot? Now let him turn for a moment from his fields to his waters. These he has heretofore neglected as worthless. He has never given a thought to them unless, perhaps as a boy, it was to sit on their banks and sadly and slowly fish for the scarce denizens of the deep, which only now and then condescended to nibble. We may take it for granted that the waters are as bare as in his boyhood's days, probably more so, having been worked at by other boys and not restocked or stocked with the right kind of growth. There is the exhausted trout brook perhaps with its banks denuded of their natural shade and no longer fit for the residence of the only kind of fish which ever inhabited them; or more likely and more fortunately some placid pond which never held anything but perch or suckers and the pretty little sunfish, and these now scarce; or we will say there is nothing but the duck pond, a perrennial one nevertheless, for it will not do to cultivate fish with the water that is past, and though the eel raisers of Southern Europe combine agriculture and aquaculture, they do not prosecute both at once. Well, having any of these, he begins to inquire about the possibility of putting them to use, and what does he find the prospect to be? In the first place he discovers that there are all sorts of fish for all sorts of uses. The high-priced, rather impracticable, brook trout for the spring runs and pond. These he will not need unless he can rent out his fishing privileges to citizens who can save from the doctor what goes for their sport. The bass for the perch ponds and the carp for the mud holes. He ascertains that some of these require no care or management further than their introduction into suitable waters, and will not only breed with immense rapidity, but will turn into human food the worthless creatures which, in the shape of sucker or sunfish, dwelt in happy and useless peace with themselves in their seclusion. He will also find that those fish which have to be cultivated require far less labor and yield far greater profit than the best of his cereals or earthy productions. A trout of a pound weight yields a thousand eggs; a shad gives ten times as many, while a codfish is credited with as many as nine millions. Instead of his five hundred for one, which he considers the height of his hopes, the farmer can get at least a thousand for one, and may reach easily far more. But another consideration presents itself—instead of the exhausting labor of the corn or harvest field he has little to do besides the original trouble of planting or spawning, which is mostly done in the spare winter or spring months. After that he has simply to take of his abundance and put in his thumb and pull out as many plums as he may wish. The catching of fish is not regarded even by the boy, reluctant as he is to work, as a severe labor, and people have been known to get much pleasure from it. In fact, the farmer will find all his younger scions far more willing to toil in his fish farm than in his land one. He may trust them to supply the table if he will only supply the waters.

It will not do to leave you with mere generalizations concerning the benefits to be obtained, but time only admits of presenting a few of the actual results that have been proved by positive experience. To begin we will take the shad, which, as a migratory fish, was one of the most difficult to handle and uncertain in results. The supply had so deteriorated in Northern waters that its extinction in them was a matter of but a few years, though it was still quite abundant in the South, where the rivers had not been fished to their capacity. In the Hudson River the fisheries were being discontinued, the supply in the market was not only diminishing in quantity but, what is an equally fatal sign, was deteriorating in size, while the price had risen. In ten years of shad culture this has been entirely changed; the supply has kept up with the increased demand, the price has remained stationary, if not actually diminished, while the size has increased. By the best statistics which can be obtained the yield of the Connecticut since the commencement of shad hatching operations was larger than it ever was before even in the earliest times. In 1868 few shad of six pounds could be had for love or money on the stalls of this city, and as to those of seven or eight they were practically unknown. Now five and six pounders are the common run, people not caring to buy them smaller, and those of eight are by no means rare. Indeed, in spite of the increase of population and demand, shad are in their season about the cheapest fish to be had. All this while the Southern rivers, which had been neglected, were running down till the most prolific of them, the James, was so nearly exhausted that the United States Fishery Commission when they undertook to restock it could hardly obtain the necessary number of mature spawners, and the St. John of Florida will inevitably in a few years be utterly without shad. Thus while fish culture saved our Northern rivers its omission changed the one time prolific yield of the Southern into scarcity or barrenness. When we come to speak of black bass the difficulty is to determine where to begin to give examples. Its introduction has been so easy and simple, and it has thriven so wonderfully that there would rather be trouble in finding failures than successes. All large suitable waters that have been stocked with them have shown the most surprising benefits. Innumerable ponds have been so treated, and the remarkable cases of the Potomac and the Delaware have been the wonder of fish culturists themselves. Why there is a little lake on Long Island called Lake Ronkonkoma which, when I used to visit it in my youthful days, contained nothing but perch and sunfish in addition to a venerable and excellent family of bullheads or catfish, which, by the way, are much better eating than their appearance would lead the beholder to expect. A few salmon trout and black bass were introduced about ten years ago, and for the past five years excellent fishing has been had in this isolated pond, which has little inlet and no outlet, and hundreds of thousands of pounds of excellent food have been taken from it. Let me incidentally mention a habit of the black bass which exists equally in the graceful catty and adds enormously to the value of both. All varieties of both these species bring up their families by hand, or fin so to speak. They do not, like the reckless trout, after depositing their eggs leave them to the hard mercies of the cold and watery waste, but they hover over and watch them till they are hatched. Nor do they remit their parental duties then, but nurse their tender young with all the solicitude of an affectionate hen, leading them about and warning them against the danger of the cruel hook and deleterious food, twining the tiny twigs and bringing up the little shoots as they ought to be inclined. The consequence of this care is that so long as black bass can obtain abundant food and are in waters suited to their necessities they will almost hold their own against the ravages of net and spear, and certainly against that of the more legitimate hook and line. They are essentially food fish, although the small mouthed variety gives fine fun to the boy and the sportsman. Although the finer kind can only live in clear waters with hard bottom, the coarser, or big mouthed variety, thrives in muddy ponds where flags and reeds abound and where the water may become discolored by freshet. In one of my earliest books on sporting I presumed to denominate the black bass as *par excellence* the game fish of America--and time has more than justified my encomiums. Wherever they can be made to live no other species is necessary, unless the applicant is merely a sportsman and looks to pleasure rather than to profit.

But while the general introduction of trout, and its still more delicate congener, the salmon trout, by private enterprise is not to be advised, great success can be obtained with both where there is sufficient care and proper opportunity. We have some remarkable instances of this. Not to speak of the State Hatchery, where trout of all sorts are bred by the million with as much certainty as though we were growing peas, the South Side Club on Long Island has brought up its preserves and with them the value of its shares of stock by intelligent operations in trout hatching in a most remarkable degree, their pond and stream had been over-fished and poached till they had run down deplorably, and not till about six years ago were attempts undertaken at making good the diminution by artificial methods. To-day their preserves are so full of trout that every member of the association is sure of filling his creel no matter how unfavorable the weather, while most, if not all, of the expenses have been paid by the amount of fish sent to market and sold, amounting to as much as five thousand dollars yearly. Another instance is that of Bisby Lake, where brook trout were unknown, their place being usurped by a local variety called the Bisby trout, entirely different in all its habits and in its appearance, although delicious as an edible. Only a few years ago the true trout were introduced under the auspices of a club which had leased the lake, and now not only is the fishing good but a hatchery, established by the club, gets all the spawners it needs from those which come in from the lake in the natural way. Salmon trout has been introduced into Lake George, where the fishing had wholly run out, with equally gratifying results, in Keuka, the vineyard lake of the State, and many others, though they are the most delicate and difficult of all our varieties of fish, require the coolest water and the rarest conditions. Last year the salmon trout fishing at Lake George was the delight of hundreds of visitors, and I have spent many a successful day on the surface of Keuka where the grape vines on the surrounding hills cast their fathomless green shadows and the icy waters are filled with magnificent salmon trout. But I will not go on giving individual instances. Where there have been failures it was due either to the want of intelligent management or to the fact that a novel experiment was tried. In the latter case no man can positively predict the result. When we come to bringing salmon or trout from California, planting shad in the Pacific or introducing carp from the old world to the mud of the new, the best fish culturists cannot answer for the outcome. That we have made so many successes in such untried endeavors is rather a matter of surprise. Shad are now almost abundant in the markets of San Francisco, carp are getting acclimatized in many an American mud hole, while if California salmon have not come up to their duty on the Atlantic coast, the California trout promise under favorable circumstances to make up for the failure of their bigger brethren. We have seen great benefit follow the acclimatization of foreign species of animals and plants, the farmer could hardly get along without the horse which came from Europe to this country and of which he is continually striving to get better breeds, or the imported bulls which are improving our stock of cattle. Not a season passes but he does try some new kind of seed or plant, he experiments with Egyptian wheat, sorghum and with millet, and now and then as with the latter in California he strikes a bonanza and more than makes up for all his disappointments. So with fish culture although we cannot expect to succeed every time we bring in a new breed of fish we are sure once in a while to hit some sort peculiarly adapted to American waters and then we have our reward.

It is important that all who have the intention of trying the cultivation or introduction of fish should bear in mind that skill and knowledge do not come of themselves in anything. To insure success they must consult some one who is experienced and familiar with the subject. Fish culture, even in its rudest forms, can no more be learned by instinct than can farming. I can only say this however, that I have had some experience of both land cultivation and water cultivation and that it took me much longer to learn how to manage the land than it did to extract the necessary secrets from the liquid farm and to-day, I am less certain of the results of my plough or hoe than I am of my trays and troughs. When I put in my corn and it never comes up I can only scratch my head and plant it over, but when my fish eggs disappear or fail to hatch I am pretty sure to know the reason why, and generally have to confess that the blame is with me, or with some of those I have employed. Had I ever been able to grow as large a return of wheat, as I have of trout, I would be a model farmer to-day and you and I would be on the sure road to " wealth beyond the dreams of avarice."

I have not taken up your time with references to that last immigrant from the effete lands of Europe, that unpolished commoner the carp, for the reason that I think he is not up to equality with our freeborn American fish. Still he has his place in the economy of nature and will live and grow fat and make broad his phylacteries where his more aristocratic brethren would die of disgust. No pond hole is too dirty and few too small for him, no food is beneath his notice, and he gets on with little encouragement. Credited as a vegetarian he will eat angle worms with gusto and the only time I ever fished for him I caught him with bits of beef lights. He is the scavenger of the ponds, and yet a very gentle and amiable one. He will live on a carrot, delights in bread and water and is captured with a cherry. He will live hours out of water and when you carry him around as a lady does a pet poodle he looks up at you with the confiding air of a friend. I think more of him in the way of sport than I do in the way of food and yet the most dispassionate and least hungry will admit that a carp is far better than no fish, and the more hungry the critic becomes the more will he be convinced of this fact. But bread and turnips will never produce the quality of fish flesh induced by a diet of bugs and butterflies. If you have a trout stream on your farm by all means replenish it with trout, if only for the pleasure of catching them artistically and training your children in simple and virtuous enjoyments, of which none of us have too many in this world. If you actually need the fish for food, or if you own or your farm borders on a large lake, put in it one of the varieties of bass; if you have nothing more than a good sized mud hole try a few carp. But as you do not expect to fill your barns from one acre of ground, so do not suppose you can feed your family all the fish they can eat out of a disused duck pond, though carp have been known to grow three pounds in a year. You have heretofore neglected the water wholly; do not now go to the other extreme of expecting everything from it. You may, however, submit your operations to this test, whether acre for acre, you will not get twice as much off your water farm, than off your land farm, taking cost and labor into consideration.

When you have planted your new seed, you must not think you can leave it wholly neglected; it will require a little care. You must see that it is not all stolen, that it is not wasted before it has had time to increase and multiply; you cannot expect to plant a dozen fish this year and take out a thousand next. You will have to guard them so that the parents are not all killed off prematurely. You must keep out the poacher with his net and his spear, and after the new industry is established, remember it will not bear an unlimited amount of strain and is capable of exhaustion by over-fishing. A passage from the last report of the Michigan Commissioners is instructive. "It will be remembered," they say, "that in 1876, a small plant of these fish (Schoodic Salmon) was made in Log Lake, Kalkaska County, where they attained a weight of eight pounds in three years. The lake is small and clear and all have been speared out."

If you plant your fish and your neighbor seeks them on their spawning beds, where they are at his mercy, and either catches them with a net or kills them with a spear, you will look in vain for their young. From nothing, nothing comes, though many people who would not go into their hennery, after they had eaten their last chicken, to search for eggs, expect to find fish in the water from which they have taken the last inhabitant. There is a good story told of a country gentleman, in England, who was very anxious for a visit from a friend who resided in London. The latter, being an ardent fisherman, would not waste his time in the country unless he could do it with the aid of his hook and line, and as there was a pond on the place, which like most ponds had nothing in it, the owner purchased fifty carp and sent word to his friend that he could give him capital sport. The fisherman came promptly and getting up early the next morning, caught the entire fifty carp before breakfast to his host's horror, and thus brought the visit to an untimely end.

No other land in the world is so favored in the quantity and kind of piscatorial productions as America. Of the sea fish, it may be said, "their name is legion." Although the salmon is only to be found in Maine, and all attempts to introduce him elsewhere have failed from natural causes or the greater importance of other industries which would have to be sacrificed, the shad, the spanish mackerel, the blue fish, the sheepshead, the striped bass, the sea bass, the black fish, more than make up for his loss while the deep ocean fishes, the herring, cod, halibut, haddock, &c., &c., are still abundant off our coasts and may yet, by the aid of proper cultivation, be brought as close to our shores as they will live. Of the non-migratory salmons we have the brook trout, the California trout, which, living as it does, in a higher temperature of water than its eastern brother, promises to replace the latter in all those streams from which the cooling border of trees has been removed and which are no longer habitable by their original occupants. The salmon trout, of which there are two or more species, the white fish, the rare and delicate grayling, that as yet we have failed to hatch, the land locked salmon that nominal salmon, the smelt and many species which are still hidden in the hills of California or Oregon. Then there is the valuable black bass of two species, that of the North, small mounted and that of the South, often spoken of there as chub and both game to catch and good to eat and that worthy but despised fish called bullhead or cat fish, which grows to a hundred pounds weight in the Missippippi, and at his biggest and coarsest is better than our imported friend the European carp either to eat or to catch; the perch, mild as sport but far from despicable when fresh out of the frying pan and his more pretentious brother that capital fish the pike perch, a variety that has so many common names, he can hardly be distinguished by any; the strawberry bass, rock bass, the magnificent mascallonge with his fifty pounds of energy and succulence, the common pickerel no better than the carp on the table, but better on the line when fished for after the approved method of floats and flags, down to the Long Island pickerel which has a vile habit of devouring young trout fry but is not bad as food; and so many other kinds that it would require a walk through the markets even to recall their names. All or most of these can be hatched artificially or used to propagate themselves. They can be made abundant where they are now scarce, they can be brought home to the door of every farmer in the land, they can be grown as tame animals are grown and much more easily. The time is not far distant when water farming will be the hand maiden of land farming and millions of fish will be living where there are none to-day.

Mr. Eugene Blackford was the next speaker. He said: It is less than 150 years since the artificial cultivation of the brook trout was discovered by a German named Ludwig Jacobi, although it is often said that the Chinese had practised fish culture many centuries ago. But the Chinese had simply learned to be very expert in the transplanting of young fry from one place to another—quite a different thing from artificial propagation. Even after Jacobi's success, no practical use was made of the discovery for many years. Thirty-two years ago, a gentleman in Cleveland artificially propagated brook trout, but simply as an interesting scientific experiment, and it is only twenty-one years ago that Mr. Seth Green first established a hatching house and made trout culture a pecuniary success. His triumph created a great sensation through the country and nearly everybody who had a brook on his farm set to work to harvest the enormous returns which the newspapers assured them could be secured. Nearly all these experiments ended in failure, owing to causes which need not be detailed. It is about eighteen years ago since the first establishment of what might be called public fish culture by the State of Massachusetts in making a shad hatchery on the Connecticut. The work was under the direction of Mr. Green and although shad had become very scarce, in a few years, they were again as plentiful as ever. The Fish Culturist's Association was organized in 1871, mainly with the idea at first of establishing a scale of prices at which the eggs and fry of trout might be sold to the uninitiated, but it soon outgrew that purpose and has now become a national society of gentlemen interested in the fish industries of the country. A great deal of the pecuniary success of the early fish culturists was derived from the fact that the desire to engage in fish culture was very general, and there was a brisk market for young brook trout fry just hatched out at ten dollars a 1,000; but this soon died away, and then they were compelled to fall back on the markets for income. And raising trout for the market is a very expensive business. It has been demonstrated again and again that in order to raise one pound of trout you have to feed at least a dollar's worth of chopped liver, and as the highest price in market is one dollar a pound, the profits are not enormous. It was in 1871, that young shad were first transported from the Atlantic to the Pacific Coast, Mr. Green carrying across and depositing in the Sacramento river several thousands of young fish. In seven years thereafter, upwards of 1,000 shad were taken in the Sacramento, and within the last two or three years, shad have made their appearance in large numbers in most of the streams of the coast, even as far North as Puget Sound. This is one of our most remarkable successes, for the young shad is one of the most difficult things in the world to transplant. The eggs are so very tender that you cannot handle them, and when hatched out the shad is nothing more than a small animated thread in the water.

Mr. Blackford here exhibited in jars some specimens of recently hatched white fish and California trout.

Mr. Rives: What food is the best for these newly hatched fry?

Mr. Blackford: That is according to the locality. At Cold Spring, we find the cheapest and best food to be soft clams, cut up very fine and made into a paste, as it were. At the New York State Hatchery at Caledonia, the cheapest food is the liver and lights of cattle, chopped up, of course. For the very young fish, it is chopped up so fine that it is a mere paste, and for the larger fish, one or two pounds in weight, it is chopped in little chunks as large as the end of your finger.

Mr. Jay: How long will they live in these jars without air?

Mr. Blackford: That is according to the quantity of oxygen there is in the water. In a very cold temperature these fish will live in a jar of that kind about twenty-four hours; but if you give them a change of water and take proper care of them, they can be kept alive indefinitely and I have no doubt you could raise them to maturity in your parlor, provided you had a large enough tank and a current of pure water. Fish culture is a most interesting study. In a little apparatus no larger than one of these dinner plates you can hatch out eggs and watch the development of the fish until it becomes an inch or two long. Of course, the larger it grows, the more water and room you have to give it. Another of the remarkable successes of fish culture has been the transplanting of striped bass. About six years ago, an aquarium car was sent to the Pacific Coast with 300 small striped bass, measuring about one-half inches long, and during the past year striped bass have been taken on the California Coast weighing three to five pounds a piece. Some six or seven years ago, a very large quantity of salmon were hatched and turned loose into the Connecticut river, and four years after, in the vicinity of Saybrook in one season 600 salmon weighing from ten to twenty pounds apiece were taken in the shad nets set at the mouth of the river. The following year 125 or 130 more were caught, and then a law was passed prohibiting their capture. We have in the Hudson the champion river for the production of shad. Nets are set from Sandy Hook to Troy and the wonder is how any shad can get above Poughkeepsie, yet it is undisputed that the production is equal to, if not greater than what it was in the days of our grandfathers, when shad sold for five cents each. This plenty is beyond doubt due to the intelligent fish culturing operations of the New York Fish Commission. I wish, however, that every gentleman here would give countenance and support to some measure which shall make the shad men take their nets out of the river a least one day in the week, and so give the fish free course up to their spawning beds. If the rest were only from Saturday night to Monday morning, it would yield us enormous interest after two or three years. When I speak of shad being as plentiful as formerly, let me add that the higher price you now pay for a shad is no indication of its greater scarcity. When your grandfathers paid five cents each for shad, there were no facilities for transporting them to the interior markets, and there were only one-eighth of our present city population to feed. If there were no better facilities for disposing of them now than then, I think shad would probably be sold five for a cent. In 1878 the United States Fish Commission first hatched the cod fish at Gloucester, Mass., and while I do not believe there is any vital necessity for increasing the supply of cod fish, because there is no indication of a failure of supply, yet it is perhaps the most important article of fish food. Nice and fresh and alive, it is a little better than a trout, because you can eat it every day for a month and not tire of it. In the first year, the Commission hatched 9,500,000—but then each cod fish produces from 9,000,000 to 15,000,000 eggs. Professor Huxley, to show the fecundity of the fish family, says that a single pair of herring, if left undisturbed and if all their fry arrived at maturity would at the end of four years fill the basin of the Atlantic Ocean solid with fish so that you might walk across from here to London. But of course nature has provided this amount of growing material, not for the sole purpose of making mature fish, but to feed other fish. New York State, we may say without egotism, has been the pioneer in practical fish culture. Up to the present time, it has given $250,000 in annual appropriations of from $8,000 to $15,000 and I think the results have fully warranted the expenditure, for taking only the one article of shad, the fact that this very important and favorite food has been kept abundant is of itself an ample return. Perhaps, however, at least from the practical marketman's point of view, the culture of the trout is not paying for the trouble and the amount of money expended upon it. Brook trout culture has been successful where it has been prosecuted, as it has been by the South Side Club, by gentlemen who have had the time and means and leisure to properly attend to it, but my own theory is that brook trout and salmon cannot exist in streams along which man has settled and cleared away the shade giving forests and into which he empties his refuse. One of the curiosities of fish culture is the regular and frequent exchange of eggs between Europe and America. Every season, the New York State and United States Commissions receive the eggs of the European trout and white fish and formerly also the young fry of the carp; and we have sent them the eggs of our own brook trout and millions of eggs of the California salmon.

Mr. Rives: Has the shad been successful in Europe?

Mr. Blackford: No, sir, they have not been successfully transported. Three different efforts have been made to transport their eggs to Europe but they are so delicate and they hatch so quickly that they hatch out on the way and seem to die apparently for the want of food before reaching the other side. An ingenious arrangement has now been made by the United States Fish Commission by which the development of the eggs is to be retarded and it is hoped that in the end these efforts will be crowned with success. Some allusion has been made to the German carp. The carp was not introduced here for the purpose of competing with the finer food fishes but simply because it will live in localities where all other food fishes die, and it is the easiest cultivated of all fishes and grows to an enormous size in a short time. It absolutely needs no attention and in the West and South-west where fresh fish is very scarce, it will fill a great want.

Mr. Wing: Has there been any effort made to introduce the turbot?

Mr. Blackford: Four or five years ago, the Hamilton Fish brought over some seven specimens of the English sole that the captain succeeded in bringing here alive. I turned them loose in the vicinity of Sandy Hook. A few more were brought two years after that—twelve turbot and fifteen soles—and turned loose on a sandy bottom at Coney Island, near the Hotel Brighton. Since that time, we have heard nothing of them and I don't expect to very strongly, because the English methods of fishing for turbot and sole—with a trawl that scrapes on the bottom and scrapes everything off it—is not practised here. We are in hopes that some one will accidentally hook on to a turbot one of these days, but we don't want to encourage that destructive mode of fishing.

Mr. Cannon: I think Mr. Jay will recollect that thirty years ago we fished for turbot. We brought out a trawl net from England and we started out with it on the coast of Rhode Island. We went to the bottom and raked up everything, finding fifteen or sixteen varieties of the flounder family that were unknown, but we neither got turbot nor sole. That effort was made first by Captain McKinnon in consequence of a tradition that Admiral Sir Isaac Coffin, when he was on this coast in 1812 and 1815, had taken turbot and sole.

On motion of the Hon. John Jay, a committee was appointed to confer with the New York State Fish Commission upon the subject of legislative aid, and to prepare a petition to be signed by the members of the New York Farmers, in case such a course be thought expedient by the Commission.

Messrs. Jay, Chandler and Rives were named by the Chairman as such committee.

Gen'l Horace Porter closed the evening with a number of original fish stories and the " Farmers " then adjourned for the season.

# Proceedings

# of the

# New York Farmers

SEASON 1885—86.

PRINT
GLOBE STATIONERY AND PRINTING CO.,
89 LIBERTY STREET,
NEW YORK.

# MEMBERS.

Hon. Chester A. Arthur, Honorary Member.

Dr. Cornelius R. Agnew.
Mr. Daniel F. Appleton.
Mr. John S. Barnes.
Mr. George A. Beck.
Mr. Frederic Bronson.
Mr. George H. Brown.
Mr. James A. Burden.
Mr. Le Grand B. Cannon.
Prof. Charles F. Chandler.
Mr. Smith Clift.
Mr. Erastus Corning.
Mr. Alfred B. Darling.
Mr. William B. Dinsmore.
Mr. William M. Evarts.
Mr. Theodore A. Havemeyer.
Mr. John J. Holly.
Mr. Adrian Iselin.
Mr. John Jay.
Mr. Charles Lanier.
Dr. J. Lawrence Lee.
Mr. Johnston Livingston.
Mr. Pierre Lorillard.
Mr. J. Pierpont Morgan.
Mr. James Otis.
Mr. Henry E. Pellew.
Mr. George B. Post.
Mr. Frederic A. Potts.
Mr. Francis R. Rives.
Mr. F. Augustus Schermerhorn.
Mr. James O. Sheldon.
Mr. Samuel Sloan.
Mr. James Stillman.
Mr. Thomas Sturgis.
Mr. Rutherford Stuyvesant.
Mr. Benjamin L. Swan.
Mr. Edwin Thorne.
Mr. Samuel Thorne.
Mr. W. Austin Wadsworth.
Mr. John Hobert Warren.
Mr. John D. Wing.

## COMMITTEE ON NOMINATIONS FOR MEMBERSHIP.

Mr. Daniel F. Appleton.
Mr. John D. Wing.
Mr. Frederic Bronson.

# OFFICERS.

| | |
|---|---|
| President, - - - - | Mr. FRANCIS R. RIVES. |
| Vice-President, - - - - | Mr. JOHN JAY. |
| Sec'y and Treas., - - - | Mr. JAMES OTIS. |

Address of Sec'y and Treas., No. 22 East 10th Street.

JAMES W. TOOLEY, Stenographer

~~a. A. 2968~~

# The “New York Farmers”

MET together at the Hotel Brunswick on the 19th December, 1885, Mr. Legrand B. Cannon presiding.

Mr. Cannon, after explaining that the gentlemen who had been expected to make special addresses upon the subject selected for the evening’s discussion—“The Preservation of Game”—were both unavoidably absent, introduced Senator George F. Edmunds, who said :

Mr. Chairman : When you did me the kindness to write me in your beautiful farmer-like hand an invitation to come to your dinner, you forgot to tell me that I was to use my lips in any other way than this (pointing to the table), and so I think it hardly fair to call on me, but as you are a Vermonter and the king of us folks, because you live in the highest part of our town, I am bound to respond. To begin seriously, I think that a good many people at this table can tell a good deal about the preservation of game. I am bound also to say for my friend Dr. Goldsmith, to whom the chairman has referred, that he is not only an ardent sportsman and a great naturalist, but he was one among the most skilful and vigorous and patriotic of the great army of Northern surgeons that went to the war. Since those days, he has been amongst the most honored and respected of our citizens and amongst the most skilful of our surgeons ; and consistent with that—as all your various avocations are consistent with your having hard hands and managing the plow—he has carried the gun, and he has thrown the fly and he has caught the trout—sometimes, I fear, caught him out of season, for, with all his zeal, like St. Paul, he will be once in a while the chief of sinners. If he could have been here, he would have told us much worth knowing. There is one thing I wish to say about game—a serious thing, too, although many people, including our legislators, do not seem to think of it—and that is, that the value of the hunting and fishing propensity to the welfare of a free, independent and intelligent society, is immense. I am not joking a bit. I am saying what I think. The boy of five or six years old, whose mother, as my mother did for me, makes him a hook out of a pin and spins him on her own spinning wheel the linen thread for the line—I can see it now as vividly as the table before me—and who then goes out to the rolling brook under the pine and the hemlock and the beech, and sees there all the aspects and all the forces of nature, is drinking in a strength of independence, of manhood, of self-respect, of persistence, of hardihood and of all that makes up, as we know, in every hill and mountain country, the strongest and the most intelligent part of society. Then, when you turn to the other aspects of it, to those sweeter and fairer influences that touch other sentiments and reveal other sides of nature, how much there is learned by the boy or the man—boy still in all that sees and feels—as he goes to the woods and streams and sees the infinite skies and stars above him! (applause.) It was not a great while ago that Longfellow told us the story of that town in Massachusetts somewhere where it was thought that the sparrows—not the English or imported sparrows, mind, for I am a very high tariff man on that question—and the robins and wrens and swallows were eating up the farmers' grain, which was a terrible drain upon the resources of society, and so they had had a town meeting, as we always have in New England when anything important is to be done. The farmers made their speeches and pointed out how much wheat and rye and barley had been stolen, and how many seeds had been dug up in the garden and all that, and there was a majority vote given to kill all the birds. So they went to work and killed them off and in three or four years afterwards, there came more than the plagues of Egypt—worms infinite, beetles and insects of all kinds. Then they saw that they had jumped out of the frying pan into the fire, and they had another town meeting, which, of course, always cures the errors of the last one, and among those present was the schoolmaster. There were some soft-handed, surly farmers at the meeting who still insisted that this destruction of the grain by the beetles and the insects would wear itself out in a little while, and that the birds had better not be brought back. Then the schoolmaster arose to make his speech and he mentioned among other things the value of birds, that their songs were sweet and inspiring and that they lifted up the soul—and then one of those people said "Yes, that is all very well, but they only sing about half an hour in the morning before any respectable farmer is up; what good is it?" Then said the schoolmaster—and it strikes me as being one of the sweetest things that Longfellow ever wrote, "Yes, they only sing here in the morning for half an hour, but it is always morning somewhere and,

"Somewhere the birds are singing evermore."

There was an unanimous vote to restore the birds, and they came again and with them this sweet country life that all of us prize so highly. Most of us are farmers' sons, I believe. I was really brought up and bred on the farm and was taught everything that the farmer does, and so I speak of these things with some feeling for that reason. If you preserve this wild young life that our boys lead—and our girls too, if they are well taught and well brought up—on horseback, with the rod and gun or sketchbook, anything that carries them into the heart of nature, you have done a great deal for any well ordered republic.

Mr. Cannon next introduced Ex-President Chester A. Arthur, who said: I thank you, Mr. President and gentlemen, for your kind greeting.

I have given considerable attention for the last six or eight months to the question of farming because it had seemed from what attention I had given to it that that was the only occupation to which an ex-president could properly repair—the only thing which would give additional dignity and grace to his position. So I have had as much to do with farmers and met them as often as possible. I remembered that my early predecessors were all farmers, but when I thought of the farmers I knew—Farmers Otis & Cannon & Darling—I began to reflect that in those days when the presidents were farmers, a man did not have to be a millionaire before he became a farmer. That was depressing, but it did not prevent my coming over here to see whether there was a chance for me. I remember Mr. Evarts saying to me that his experience of farming was such that he was in the habit of saying to his guests "which will you have—milk or champagne? it costs just about the same?" I thank you all again for your very kind greeting. I cannot attribute it to any personal deserving on my part, but to that loyal and patriotic feeling you have towards the Federal Government and so towards one who has been its chief magistrate, and in that spirit I accept and cordially thank you for your gracious welcome.

Mr. Thomas Sturgis then said: I had no expectation of being called on this evening to say anything upon this subject, but it is a matter to which we have given some consideration even in so distant a part of the country as that in which I live, which is the territory of Wyoming. Wyoming, I presume, is the only remaining center of the home of large game, so-called, in the United States. Many years ago, the buffalo, as you are aware, ranged entirely across the central part of the continent from the Mexican line almost to the British possessions. They were in the first place divided into two immense herds by the passage or construction of the Kansas Pacific railroad, which left the southern herd upon the south and the northern portion upon the north, and stopped the annual migration backwards and forwards. The Union Pacific served as another dividing line and confined the northern herd to a still narrower limit. That left the buffalo to the northward of the Union Pacific almost exclusively in Wyoming and Montana. Those to the extreme south have been practically destroyed except what few may still linger in the western part of the Indian Territory. The buffalo, therefore, constitute our principal species of wild game. In addition to that we have innumerable herds of antelope, and the two kinds of deer which are of course well known in their general characteristics to the members of this club—that is, the black tailed deer, which has very large ears and the white tailed deer, which is the common deer of Indiana and Illinois and probably of the Adirondacks in this State. Those four species of animals constitute our wild fauna. During the early years in which I was in Wyoming, dating back nearly fifteen years, the wild game were in such preponderance that there was no question of the necessity of their preservation brought before us at all, but during the last five or six years the advent in our midst of an immense number of what we call "skin hunters," a class of men who kill not even for marketing or for food, but purely for the pelts, has caused us to give particular attention to this especial matter; and when I was in the local legislature some four years ago, I brought forward a bill for the purpose of defining the manner in which and the time during which game might be destroyed. But we met with an almost universal opposition, and I found it practically impossible to excite in the minds of the general class of residents there any desire to preserve the game. We succeeded in passing this act, which limited what might be called the open season, that is, the killing season, to a period beginning from the time in September when the young leave their mothers—about the 1st September—on until the 1st February. That we declared might be the killing season; we kept the rest of the year closed. We succeeded, as I say, in passing the bill, but we passed it, as I suppose a great many of you gentlemen may be aware bills are sometimes passed elsewhere, by trading our votes for something else for the votes of the men who would support our game law. We did not pass it upon its merits. The local matters in which we were not interested, and which, in themselves, were not injurious and which we were willing to concede, we gave away for the purpose of obtaining votes for this game law. After we had passed the law, however, it met the same fate which all acts do which fail to command the approval and the general regard of the people among whom they are enacted. It was a dead law. Finding that the sheriffs and the regularly constituted authorities of the different counties would not enforce this law—would take no pains about it—we went to work and established a small association and taxed a few gentlemen, of whom I was one, pretty heavily for the purpose of enforcing it. We appointed two or three game inspectors and contributed quite liberally for their maintenance. We had them, of course, properly commissioned, and they were given the power of deputy sheriffs and United States marshals and were thus clothed with full authority. We then made some arrests but we found it absolutely impossible to convict anybody. There was, it must be admitted, a great deal to be said on the side of the people who were opposed to the enforcement of the law. In the first place, a great many of the people throughout that scattered and thinly settled portion of the country are dependent upon this game for their food, and it was impossible to say that the miner or hunter who lived in a remote spot in the mountains should not be allowed at any season of the year to shoot the deer which ran by their doors, while their families were out of meat. They had to have it, and no jury in Wyoming certainly would convict them for an infringement of a law which is solely and merely for the preservation of a class of wild animals. The result was that after following this up for over a year with the very best endeavors to make the law effective, and when we found it impossible to do so effectually, I went myself personally and appealed to a number of the most enlightened members of the community, but it was in vain. I remember especially going to one gentlemen from Massachusetts, and on asking him for support, he said, "I would rather give you $100 for the destruction of all the buffalo in the territory than $50 for their preservation." I said "Why?" He answered "as long as the buffaloes exist, we are going to have those large bodies of Indians leaving their reservations to hunt, and where they don't find buffalo, they will kill the cattle. The argument came home to the majority of those ranchmen in that form, and it will continue to do so, in my belief, until game become very much scarcer than they are at present. To show how numerous they are still, let me give you an illustration from my own experience, In driving from Fort Steele on the Union Pacific Railway up to the North Park in the northern part of Colorado—a drive of about 40 miles, which occupied most of the day—we were not out of sight of antelope during the entire time. They came down facing the road on which we were driving, traveling like a flock of sheep, scattered along and simply turning off the trail as they came within sight of the horses, within 100 or 150 feet of us, and gazing on us till we went by. Until they become scarcer, therefore, and cease to be counted on by the people as an article of food, it will be impossible for us to preserve them in our part of the country. When they are no longer an object of interest in this way, however, we may be able to preserve the remnants of them, so that this country will not be entirely without this class of animals, including one which I have omitted to mention and which is that very noble species, the elk, called by the Indians the "waupiti." I hope we shall be able for many years to preserve enough of them to show to sportsmen and the "Farmers" when they come to Wyoming in our open season.

Mr. Le Grand B. Cannon: I regret exceedingly that Dr. Goldsmith, in consequence of his very infirm condition, cannot be with us this evening. I have a very vivid recollection, when he returned from Europe, where he went solely for the purpose of ascertaining the results of the game laws upon the preservation of game and its effects upon the country, that he stated to some of us at a dinner at my house, some remarkable facts which made a great impression upon me. He said that the effect of the enactment of the game laws upon the territory of Scotland was that the mere game rights in the whole of the acreage of all Scotland yielded 31 cents an acre annually. This came to us in Vermont with a great deal of force, for I hardly think that the whole agricultural products of that State average as much—I mean, of course, net. He stated as a further fact that the effect of the laws in Germany was to make venison cheaper than mutton. We all opened our eyes, and he added, to make it more emphatic, "you can produce deer cheaper in Vermont than sheep"—and sheep is our great staple. Of course, we all drew a very long breath and he said "I think I can prove it. You have thousands and tens of thousands of acres of mountain land—what is their value? They are substantially worthless, although they carry soil to their summits. Now, what do deer require? Nothing but to be let alone. Your sheep have got to have care. And what is the increase of the American deer? It is equal to and superior to the increase of your sheep. And what are the nutritive qualities relatively of venison and mutton? Venison is superior. You will get a larger return out of a given number of deer in absolute value in money and by pounds' weight than you can possibly get from your mutton, and all they demand, in order to thrive, is simply to be let alone." There was at that time no law in Vermont preserving game, except one for the protection of singing birds, and some of those present said "Why, there is no State where the prejudice is greater against game laws than in Vermont; they are looked upon here as one of the relics of feudalism." Dr. Goldsmith answered "there is a strange fiction of law that dead game is property but live game is not—now we propose to make live game property and give you farmers a law which will make it property on the farm." That came home to the Vermonters—to find that there was something on the farm that they could make property which had not been so before. The reason had been that game was not identifiable. Now, when it is on your property, it *is* your property, and I believe our laws are pretty stringent—first, the law of trespass, next, a penalty of so much a head for every one killed, and again, a penalty for anybody caught on the farm with a rod or gun or instrument. As a result, where those laws are properly pressed, the game have largely increased.

Senator Edmunds: In defense of the rather savage habits of the people of Vermont, it is a very curious historical fact in connection with our State —which was once, by the way part of the State of New York—that in the constitution of Vermont of 1777, springing from what your president has so properly referred to as a kind of instinct against feudalism, it was provided that the liberty to fish and hunt on all lands not enclosed, that is, not absolutely fenced in, shall be free to the people of that State at all times. That produced an embarrassment about regulating our game affairs, although we have gotten over it now.

Prof. Chas. F. Chandler: So much has been said about the State of Vermont that something is forced upon my recollection. My great grandfather had amassed certain profits in Masaachusetts and he prudently invested them in Vermont, and I remember one of my uncles went up there to see if he could not do something with these several hundred acres that my ancestor had secured. He found that they had been occupied by various settlers, and these squatters had acquired so deep an interest in the soil that every effort to obtain any recognition of his rights of ownership was entirely without avail, and as soon as it was known that he was there with the intention of establishing his rights, such menaces were made against his personal liberty and comfort that he was very glad to abandon the entire territory and get back to Massachusetts.

I have myself had some experience in the preservation of game. I was taught to preserve it under the instruction of my venerable professor, the method depending on the object sought. If we wanted to preserve all the tissues and integuments for future investigation, we put them in spirits. If we simply desired to preserve the external form, we removed the skins and applied the proper quantity of arsenical soap to the interior, and then mounted them as judiciously as possible. If, however, it was the skeleton we wished to exhibit, we were taught to boil it properly and afterwards wire together the different bones so as to display the original internal structure. Another preservation of game that I have had occasion to investigate is very important to our farming interest, and that is the preservation of beef. Few of the farmers of New York are aware of the magnitude of the preservation of game of this largest kind. We have at the present time the finest abattoir to be found anywhere in the world. It is on West 59th Street and it is really worth a visit to see how a business of that character can be conducted on the very best principles. Mr. Eastman kills there many hundred cattle a day in the most humane and cleanly and least offensive way possible. The offal of those animals is converted into a very valuable fertilizer actually before the animal fairly knows it is dead. The blood and offal of every kind are reduced to a dry powder long before any opportunity for putrefaction has taken place, and it is then put in boxes and shipped all over the country, so that what was formerly run into the rivers as an offensive offal or soiled the gutters of the city, is at once utilized. No annoying odors arise and from $30 to $35 a ton is obtained for the product. The sides of beef are put into large cooling rooms, each one as long as this room though not quite so high or so wide. The animal heat is taken out of the meat until it is reduced to a temperature of 30° or 32°. It is then put in cars which are provided with similar cooling arrangements, taken down to the ocean steamers, put again into similar refrigerator rooms, taken to Liverpool and delivered in London so that American beef competes successfully with beef brought from the interior of England and is really better. The beef of Old England does not compare with the beef from the Western States which is killed in New York, the reason being very simple. Our beef cattle are fed upon grass and theirs upon oil cake.

The "Farmers" then adjourned.

# The “New York Farmers”

MET again on the evening of the 19th January, 1886, at the Hotel Brunswick, Mr. F. R. Rives, presiding.

In opening the discussion on the selected subject of the “Feeding of Cattle,” Mr. Rives said: The subject of the feeding of cattle is unquestionably one of the first importance throughout the length and breadth of this land. It appears to me that it has recently received a renewal of interest in the older parts of the country and notably in the New England States. This interest is in a great measure due to a better knowledge and a better appreciation of that marvelous forage plant and cereal, a native of this country, with which a beneficent providence has blessed us—I mean Indian corn or maize. It is within my recollection but a very short time since that the farmers have sown broadcast or drilled corn to eke out and supplement the waning pastures of our late summer and early autumn. It is still more recently that the farmers of this country have begun to store that forage plant in the shape of ensilage in order to feed their cattle upon what the English call green meat at a period when its production is suspended in consequence of the rigors of our climate. I accept in its fullest sense the dictum that the soil is not a mine but a laboratory, and I suppose the learned professor on my left will contend that steers stomachs are laboratories too. Now, as though in order to increase the production of corn, we have had the marvelous discoveries in this country in recent times of mineral fertilizers, cheap and in enormous deposits in various parts of North America; and if, even with these, we cannot increase sufficiently the production of corn in the East for feeding purposes, we surely can buy corn from the West cheap enough for feeding purposes here. It is not a quarter of a century ago that an English traveler in the West, amazed at the extent of the cultivation of corn, asked one of the native settlers “What in the world do you do with such a quantity of maize? I can conceive of no possible use for it.” The reply was “Well, stranger, except what little is wasted in corn bread, it is all made into good whiskey.” What a change has taken place since then! A few days ago I saw that in the exports of grain from this country for the past year of 1885, about 14,000,000 bushels of wheat had gone abroad while 24,000,000 bushels of corn had been shipped for feeding purposes to the old world. In order successfully to fatten cattle, it seems to me as a farmer that it is absolutely essential that we should have early maturing breeds, adopting those breeds that through a long process of artificial selection have shown that they are capable of putting on in a short time adipose and muscular tissue in contradistinction to those breeds whose tendency is to secrete milk in enormous quantities. Feeding cattle can hardly be called a science but it is unquestionably based on scientific teachings, and those teachings we shall hear to-night. It is an art which has received great development already in the West. Some of us can scarcely believe the progress that has been made there until we go and look for ourselves as I did last year for the first time. A noted breeder of Herefords in England, came out to this country comparatively recently for the express purpose of visiting the fat stock show at Chicago. He was enthusiastic in its praise and said that he would not have missed it for £1,000 and that he thought it scarcely inferior to the prize show at London. I shall introduce to you first Mr. Atkinson. He has a passion which many of us consider a strange one—a passion for statistics—but somehow he always manages to distill from those statistics a philosophy which would fascinate, even at a feast of selected spirits.

Mr. Atkinson then said: I have always lived in the country and kept up my interest in country life, but I have been led to the particular questions now before you by way of the voluminous statistics which form my daily provender. It fell to me a year or two ago to undertake a solution of the labor question by finding out what was the true measure of the possible wages of the community—that is to say, what might be the gross value at the point of final distribution of the whole product of the United States, from which sum must of course be derived all wages, all profits and all taxes, and then to endeavor to sort out the proportions between the laborer and the capitalist, and to demonstrate as I thought conclusively to myself and perhaps acceptably to others that the limit of subsistence to about 90 per cent. of the people of this country must be the limit of what 40 or 45 cents per day for each person would buy, because that was the measure of all there was to be divided. Since then Mr. Wright, now of the U. S. Bureau of Statistics, and others, following up the quest in the same general direction, have reached the conclusion that we set the limit too high and that there is a very much larger number of persons, within the limits of this prosperous country who must find shelter, subsistence and clothing out of what less than 40 cents a day will buy than of those who enjoy more. We are are also confirmed in our conclusion that even at this apparently very low measure 90 per cent. of the whole product of the country is distributed among those who do the actual work. I was led through that to the subdivision of this limited sum and to find how it must be spent, and I reached the same conclusion which has been reached by Dr. Engel in Germany, and other investigators elsewhere; that to the larger part of the people of the country, half the price of life is the price of food; and as you go down lower and lower in the sum of the wages or annual income, the proportion which must be expended for food rises and with families whose earnings are annually perhaps $350 to $400 a year, of whom there are a great many examples, 60 per cent. of the price of life is the price of food. We have since tested that in a great variety of ways. Therefore, if 40 or 45 cents a day per person is the measure of the total subsistence for rent, clothing and food, it follows that by far the larger portion of the people of this country must live on what 20 cents a day will buy in the shape of food. The latest letter on this subject which I have received comes from the chief of the Bureau of Statistics in Ohio, one of the most prosperous States of the Union, and shows that in 136 families, representing all parts of Ohio, distributed in 45 different occupations and in 40 different counties, the average expenditure per day per person was only 32 cents and 16 cents was for food. I spoke yesterday before the Woman's Club in Boston, in order to show that a well bred man who knew how could find good shelter, sufficient clothing of a comfortable sort and an adequate supply of food, according to Professor Atwater's tables of the nutrients required, within the limit of $150 a year and that $200 would be rather extravagant. I once lived on $300 a year myself but I could live better to-day on $200. But the point is this—the man who knows how to do this will be able to earn more and will be able to spend more, while the poor fellows who cannot earn any more don't know how and therefore get a very mean subsistence out of that money.

Now, tracing out this miserably inadequate measure of subsistence according to what we who are well to-do in the world enjoy, and applying it to the problems before us;—if the average adult person in the United States enjoys as good a subsistence as the factory operative of New England and the Middle States, their food costs 20 cents a day or thereabouts—perhaps a little more, and if, of that food, out of a dietary measured at 25 cents a head for convenience which is the average of men rather than of women, 15 cents or three-fifths is spent for the product of the animal—the division being about 10 cents a day for meat, then at that rate per adult, the meat bill of the people of the United States is $1,800,000,000 a year. Five cents a day go for milk, butter and cheese—half a pint of milk, an ounce or an ounce and a half of butter and a scrap of cheese—not a very large ration, you will say but amounting to $912,000,000 a year. One egg every other day, or half a cent daily—eggs at 12 cents a dozen—represent $92,500,000, as the product of the hen mines of the United States, or to use my favorite comparison, a little more than double the product of the silver mines. When I had an opportunity last autumn to address about eight or ten of the outgoing and incoming members of Congress just after the election, I said, speaking as a merchant, that we desired them to stop the coinage of silver, but we had no hope of appealing to their reason and we proposed therefore to appeal to their senses, and inasmuch as the product of the hen mines was twice the product of the silver mines, we intended to ask them to buy 2,000,000 eggs a month and store them under the Hall of Representatives. We thought, under those conditions, there might be some chance that both acts would be repealed.

Then again, observe how these small sums of farm products per day rise into untold millions, and yet how seldom during the year, does the influence of the farmer shape the legislation of the country!—how very seldom do we hear of this enormous distribution of meat and milk and butter and cheese as compared to other prominent and conspicuous products! You observe that the annual product of hens' eggs at only 12 cents per dozen is 50 per cent. more than the entire product of wool, about which the whole legislation of the county is disturbed, as if wool were the most important product of agriculture instead of being one of the most insignificant. The product of the poultry yards of poultry and eggs combined is more than equal to the entire product of pig iron, wool and silver combined. Yet who stands in Congress to represent the domestic hen! I told these members of Congress that I demanded that the interests of the hen should be protected by special legislation. Three-fifths of the price of life consists then of meat, milk, butter, cheese and eggs, and the aggregate is $2,800,000,000 a year. Now, who stands behind that and what sort of a factor is it in other ways? Nearly half of all who are occupied in gainful occupations are engaged in the primary work in these industries. Sort them a bit! Seventeen per cent. of their product in the census year was exported. Seventeen per cent. of the number of farmers represented 1,300,000 men dependent upon a foreign market for their daily bread and dependent upon British and French and German gold for their support. Add to that the number of persons engaged in the transportation and the like and you have 1,500,000 people. Seven-eighths of all the traffic of the railways is furnished by the agricultural industry, which inconspicuous as it may be in the concentration of its work, yet underlies and sustains all; and the danger of the country to-day is that finding their crops shut in, finding their pork down to five and a half cents at the seaboard, and their wheat hardly bringing the cost of production, the main swell of unreasoning farmers may rise and make such changes in the legislation of the country without reason and without consideration that there may be as many hardships and difficulties in getting out of a bad system of taxation as there have ever been from its imposition. So that I say to-day we need to look to the farmers and to guiding the interests of agriculture by scientific methods in new directions to save them from the hardships that are coming from the failure of their old lines of work. And that leads us round directly to this question of the feeding of beef. If each adult person in the United States gets as much beef as the factory operative of New England or the Middle States, from the dietaries I have examined, it is three cents a day, or $600,000,000 a year, and that makes the beef product at its final point of distribution equal to the entire product of the textile factories of the United States put together. And yet, having put the conundrum publicly about a year ago in many ways throughout this country, "What is the cost of making a pound of beef?" no precise or accurate answer has yet been given me. The nearest approach is one lately made by Prof. Stewart in the "Country Gentleman" and that seemed to prove very conclusively the rash statement which I had ventured to make from my previous hypothetical reasoning that beef could be raised upon the deserted farms of New England and perhaps of New York at this moment at as low if not a lower cost than it could be brought from Texas. That statement indicated conclusively that where corn could be bought at 71 cents per 100 pounds, by the old methods of agriculture without the silo, two year old steers could be made at a trifle over four cents a pound. At a meeting of the New England Farmers the other day a very skillful breeder of beef cattle confirmed that statement for although he could not exactly measure his beef, yet on a good farm in Maine, working with the old methods of grass and hay and Indian corn, he has taken the first prize at a fat cattle show in Chicago and is supplying the principal hotels and epicures of New York and Boston with the finest beef at low cost. Now, I am neither a farmer nor scientist, but I say that when we are losing our market for our wheat, when we are witnessing the great hog crop going down to less than cost, shut out from the markets which it has heretofore enjoyed, it is time that we turn the attention of farmers. even for our own interests, to that which never seems to be in over-supply—the production of beef. To that end, I suggested to my friend Mr. Cannon that no man in this country could give more enlightened information than Prof. Atwater and I am here as a faint shadow of him. What I desire to say to you is this:—rendering all praise to you for the good work that has been done in improving the breed of the Jerseys and the milchcows and the horses of the country at probably very considerable expense to yourselves, the thing now most needed is to prove to the farmers of the country how the factory principle can be applied to the production of beef with profit in order that they may learn the lesson for themselves. And herein comes the intense system of farming—the publication of the working of rations for cattle scientifically compounded according to their relative proportions of the nutrients which make meat and muscle. Prof. Atwater will tell you how the narrow conditions of life in Germany have forced the attention of Germans to the study of nutrition, so that now the government there is printing dietaries, or rations as they may be called, of the quantities of different kinds of food which will yield to each working man the exact proportions of protein and nitrogen, of fats and carbo-hydrates or starches that are required to sustain man in full vigorous life. It is curious to compare the rations which Prof. Atwater has got up with those of Germany and to see how much more one can get for his money in this country than in Germany, and how lightly here the pressure has yet brought about that scientific attention which is required there in order that people may live. He will say to you that when you buy your sirloin of beef at 25 cents a pound, if you can get it as low as that, you pay $1.06 for the same protein or nitrogen,—which is the most expensive part of your food—that you can obtain for 13 cents if you buy oatmeal at five cents. It has occurred to me that the production of the meat of other animals must be reached by precisely the same methods. If it lays now in the power of the scientist to define the right proportions and elements of human food so as to show men how they can live on 10 cents a day and be fully sustained,—and since then, in some experiments that I have been making, I have got the man's ration for a working man down to less than five cents a day, including the fuel to cook it with—then with cattle, it may be said that the man who feeds them with hay is like the one who feeds his workmen with sirloin of beef, paying $1.06 for the protein, when if he would take the waste substances on his and other farms and compound them in a scientific way, corresponding with the use of oatmeal for man, he would get the same result for 13 cents. The work now to be done is to make beef out of the waste of our soil. I believe it can be done and Prof. Atwater will sustain this view of the matter, and I know that some farmers in his neighborhood who have enjoyed the benefit of his teachings, having thought formerly that they must not sell a pound of hay, now sell every pound and make their profit in it. Now how shall we start a beef factory? I use the term "factory" advisedly. We underwriters have altered the architecture of the cotton and woolen factories. We have been gradually cutting off story after story and inducing our clients to spread out over the ground until the one-story factory, lighter, better, more stable, cooler in summer and warmer in winter, can be built at $32,000 an acre and you can contract for it by the acre if you want to. Such a building would be the most excellent beef factory that could be devised, but would not require to be so strong or so expensive. $25,000 an acre would build a warm, well-ventilated, well lighted beef factory that would hold 800 steers. I won't ask you to sustain two steers to one acre, although I believe it can be done, but with one steer to two acres, feeding them scientifically with ensilage and with the waste of the farm, you can buy for $50,000, land enough to carry 800 steers. With $100,000 of capital, you can house and feed 800 steers—$30,000 for the factory, $25,000 to $50,000 for the land and $25,000 for the machinery, At any rate, you can then make a profit by finishing off for market the range cattle; but if ensilage can be made as cheaply as the evidence goes to show, a year's supply of ensilage for one steer, can be put into the silo ready for use at the cost of bringing the steer from Nebraska to the center of New York, if the waste of the steer be added to the lowest railway charge that can be put on that steer.

Now, then, I say that it is time that the same science, the same method, the same economy of labor should be applied to this substance which at its point of consumption is to-day equal in value to the entire product of all our textile factories, to the end that with high wages to the workman and low cost of production—and they always go together under intelligent management—the people of this country may receive their adequate supply of beef. Thus far, you have all that the statistician can say to you. I think this is a new science. It is only within a few years that even the division of the nutrients required for human beings has been made by the scientists and only this very evening, Prof. Atwater has shown me how curiously the results of scientific efforts in this direction agree. Sir Lyon Playfair has set up one standard—so much protein, and so much fat and so much carbohydrates—Vogt, of Germany, another, and three or four other men yet others. They vary a little, but being reduced to units of heat, they almost identically correspond,—that is, in the last analysis of the units of heat or the mechanical equivalent of heat which each one of these rations stands for, although they vary one from the other materially in their component elements, they all come to one point—the correlation of heat in connection with the subsistence of the human body. Another singular thing has turned up. I have always looked upon pork as concentrated grain and it takes four and one-half pounds of corn to make a pound of pork. In converting that four and one-half pounds of corn into a pound of pork, you throw away all the starch, you dispose of a large portion of the protein and you have got nothing but the fat left and the fat is just what we don't want. We have reduced the nutrient elements of the four and one-half pounds of corn, about rightly divided for the subsistence of the human or animal body in their relative portions of aliment, to a single one and that the one we want least, so that judged chemically and not physiologically, the conversion of grain into pork is the waste of the best part of the corn, whereas the conversion of corn into beef is the manufacture of that most essential element —the protein or nitrogenous portion of the food.

Mr. Rives, in introducing Prof. Atwater, said he hoped the Professor before he finished his address would touch upon one special point, and that was the chemical advantages of the comminution of grain either by crushing, grinding or cooking and which was mechanically fitter.

Prof. Atwater said: I will take up first the question proposed. As I understand it, it is this—What are the chemical advantages of the comminution of grain for food for stock? If you come with me into my laboratory, and see my assistant take a grain of corn and put it in a mortar and subject it to certain processes of analysis, you will find it to consist of certain ingredients. There will be a lot of a class of ingredients which we call carbo-hydrates. Starch will be the principal one in the corn. There will be a large class of another sort of ingredients which we call the fats or oils, and yet another class which contain the chemical element nitrogen and which we calf protein. We have been eating a lot of protein and carbohydrates to-night. We have had the fats in the small amount of fat in the meat and some also in the vegetable food we have eaten, and we have had considerable of this protein in the lean part of the meat, for muscle and blood consist mainly of protein and water. Having made a chemical analysis of the corn, you will see what we have got to do with the corn, when it is fed to the animal. It has got to be pulverized, comminuted in some way. For consider that that corn is going into the steer and it is going to be then transformed. Corn protein has got to be transformed into steer protein, or lean beef. Corn starch has got to be transformed in part into fat but more especially has got to be used up as fuel in keeping the body of that steer warm and in giving it muscular strength for work. Other elements also do some of this last, but never mind that just now. In order to do these things, all those materials have got to go into his mouth and thence into the stomach and the intestines, and then through the walls of the intestines by apertures so small that you can hardly see them with a microscope. They have to be acted upon by the digestive juices and in order that that may be successfully done, they must be in fine particles. If I want to dissolve a piece of sugar, it is better that I should break it first into small pieces. The smaller a thing is, the more readily it will dissolve. The whole of the story would take a year or two to tell, but suffice it to say that in order that the digestive juices may be able to act on all the materials introduced into the stomach, and especially that those portions may be completely digested which would otherwise escape digestion, the finer the particles the better. And now, what is the chemical effect of cooking? So far as the steer is concerned, it don't amount to much. But there is this also to be said; suppose the steer is kept in the winter, as many steers are, in a very cold barn, when it takes so many pounds of water and hay and of this, that and the other thing to put into its stomach, it has got to heat them up to the temperature of the stomach. Where does that heat come from? It must come from the burning of the food, and as a matter of fact, a farmer can cut cord wood and use it to heat the food and do it more economically than to depend on the carbo-hydrates or fat of the corn. In that respect, the cooking of the food may be at times economical.

I feel very much in the condition of a man who was a great orator and who was my antithesis in that respect, when he said that he never made a speech without having to think when he had done that he had left out his best points. I am afraid I shall leave out many of mine unless Mr. Atkinson will be so kind as to occasionally prompt me. One of the things which most interests me in all this matter which Mr. Atkinson tells about is a thing he has not referred to. When you talk about a beef factory and the making and using of beef and the problem of cheap food and getting a satisfactory dietary out of so many cents a day, you have got to take into account the fuel, and if you had known about Mr. Atkinson's invention of a cooking machine, and if you had heard him tell about his cooking minced gander or a leg of mutton for a cent or two of fuel, you would have been more interested in that than even in the beef factory. But as I understand the proposition about the beef factory, it is this: we see in New England and New York, and in all our Eastern States, countless deserted farm houses. Both of my grandfathers were farmers in Vermont, but not one grandson is a farmer, and not one granddaughter a farmer's wife in that State, and that is the story all through our Eastern States. Now that means a great deal. What is coming upon us there? What is the remedy? The only remedy is to revive the culture of the soil by devising means to make farming profitable enough to attract the smart men and keep them on the farm. Of many ways suggested, the beef factory idea is one. Some of the late developments of scientific research have brought out some very remarkable facts about the great cereal which nature has provided for us—corn. I should like to talk to you by the hour about it, but suffice it to say briefly that it may be cultivated even on our worn out soils very cheaply, Let us raise the corn and put it in the silo. I know nothing about the practical part of this, but I will tell you the chemistry of it. When we put the corn into the silo, if it is managed right, we lose no considerable amount of the nutritive material of the corn—a little, but not much. We then have a cheap product in a material which furnishes what the steer needs for fattening, what the cow needs for making milk, in almost exactly the proportion in which it should occur. There is not quite enough of protein, for we want a little more and that is the most costly element to furnish. If we could find some means of raising a leguminous plant, such as the cow pea is in the South, only hardy enough to thrive in our northern climate,—in sufficient quantity right along with the corn,—we should have an ensilage containing those proportions of protein and fats and carbo-hydrates which are best fitted for the fattening of the steer. Cotton seed meal from the South or bran from the West may at present serve as substitutes. Having mixed these with the corn, we have got the entire ration which the steer needs for fattening and at very low cost. In fattening a steer, what do we do? The material which is not used as fuel to keep his body warm and give him the muscular exercise he needs is stored in his body as fat and as protein, the latter the most costly and valuable part of the food. All of the nitrogen, which is the rarest and costliest of the elements, is either in the form of protein in his body, in which form it has attained its maximum value physiologically, or it has been excreted and by proper management should have been saved in the manure to go right back to the ground, instead of buying it at 20 cents to 40 cents a pound in the shape of commercial fertilizers. In that way you are doing a twofold thing. You are first making beef, as I hope cheaply, and at the same time you are enriching the soil by returning manure to it. And in making beef which is a most valuable meat for food, you are doing a much better thing than to make pork. It transpires from an examination of our American dietaries which I have been engaged in—that is, if the dietaries of Massachusetts and Connecticut may be taken as a type—that we are in the first place a race of enormous meat eaters and secondly, extraordinary fat eaters. We eat enormous quantities of fat, as compared with the normal demands of the body. Now, when you make your corn into pork you use up your carbo-hydrates and protein and transform the rest of the material into fat, which you do not want. So, taking the larger view of the subject from the standpoint of general animal economy the manufacture of pork involves great waste and the manufacture of beef is much more advantageous.

Let us go back to one or two fundamental questions. I suppose, whether we can do this will reduce itself to the question whether corn can be raised cheaply enough on worn out land and whether the other materials can be obtained at sufficiently low cost. Can corn be grown cheaply enough to be put in the silo? Let me make a few statements as to the feeding of plants. Show me a supply for the future of the one chemical element nitrogen in sufficient quantity for the food of plants, and the doctrine of Matthus entirely falls to the ground. I think it is safe to say that so far as regards not merely the material but the intellectual and moral welfare of the human race, when we consider the material questions which underlie all others, the most important of all is the supply of nitrogen to plants. Chemical investigation, as you who have looked into the matter know very well, has shown that every plant consists of a certain number of chemical elements. If I take a corn plant or a wisp of hay or a potato or a grain of wheat, and warm it, a certain amount of water goes out. That came through the roots from the soil. When I put it in the fire and burn it, the organic combustible matter is burned out and goes up the chimney. The material which went up the chimney came from the air except a part of the nitrogen which came from the soil. There remains the ashes. That came from the soil. The ash, then, and part of the nitrogen came from the soil. Now if you go into the laboratory and see analyses of plants made, you will find them all to contain the same list of ingredients and you will find a certain list which by experiments have been shown to be essential to the growth of the plant. A plant cannot grow without protein any more than you and I can live without it. Of these necessary chemical ingredients, certain ones are present in abundance in almost every soil, and if we could everywhere only find enough of nitrogen, phosphoric acid and potash, we need have no trouble about the worlds' future and the prosperity of mankind so far as the food supply is dependent on the soil. I am fond of saying to my class that it may be laid down as a general principle that as mankind finds new wants, science first interprets the want and then finds a source of supply. Let us see how this is in the matter of plant food. It was found long ago that these three elements, nitrogen, potassium, phosphorus, were most frequently deficient. Well, phosphoric acid was wanted and discoveries were made of the phosphates in the guanoes, and in the phosphate beds of North Carolina and Canada and various islands of the Carribean Sea, in France, in England, in Germany, everywhere indeed, until lately, as you perhaps have heard, this kind of plant food has been extracted out of iron ore, and it was only yesterday that I received from Baron Von Liebig, the son of the great chemist, a German article in which he estimated the value for plant food of the phosphoric acid extracted from iron ore by a new process. Our supply of phosphoric acid is, therefore, provided; we can get that cheaply enough; and we have enough in sight to last us a great while, and that is the material most frequently lacking in our soils. I say sometimes to my students that while as patriotic Americans we rejoice at the prosperity of the Southern States, yet that the New South is finding its great success not as the result of emancipation alone, as so many of the old time abolitionists are wont to say, but as a result of emancipation *plus* the superphosphate. Now, where shall we get the potash? Years ago, a Frenchman invented a process by which sea water was made to yield it, but the process was expensive. Lately, however, it has been found in Europe that nature has provided us with potash mines extending under an area of 60 square miles. The potash can be taken from the mine, purified and sent over here in the form of potash salts at a cost of $3,50 for 150 pounds, making a difference on one farm within half a mile of my laboratory between there being on an acre of land not corn enough to be worth the husking and 60 bushels of nice yellow corn with a magnificent growth of stalks. The supply of potash is therefore also provided and at very low cost. Now, about the nitrogen. There is the problem. My own belief is that many plants get considerable nitrogen out of the air, and I will tell you one special fact about the corn plant. We know very well that there is a difference between different plants. Farmers distinguish between the exhausting crops and the renewing crops. The exhausting crops seem to take away the virtue of the land and the renewing crops seem to bring it back again. Clover is a renewing crop, partly because it sends its roots down in the soil and gets material that other plants could not get and partly because of the fact that clover can get hold of nitrogen where other plants cannot. Clover will grow and gather nitrogen and thrive where wheat will suffer; it is a renewing crop and wheat an exhausting crop. Some years ago, in response to a question, a high authority said that the best manure for the cereals wheat, maize and rye is a mixture of superphosphate and nitrate of soda. I wondered whether that was true or not. I was at the time in charge of one of the first agricultural stations in this country, and was continually beset with such enquiries as "What shall I put on my land to make my corn grow?" or "Give me a formula for potatoes." Instead of replying "My dear sir, a physician can prescribe for your sick body but a chemist cannot for your sick soil," I said "try experiments for yourselves." After a while, I laid down a plan for a series of experiments—the same soil divided into 10 or 20 strips and each strip treated with different fertilizers. These experiments were made by the hundred and wishing to know what the result would be, I drew up a form of report, and I had these reports, which came from almost every state in the Union and every province of Canada to the number of about 300, carefully tabulated. More of them were about corn than anything else. The main question to be determined was—Is corn like the cereals? Does it respond to nitrogen and to phosphoric acid? Wheat does; oats does. Nitrogen is the dearest, and some formulas proposed to feed corn with $10 or $15 or $20 of nitrogen on an acre of land. I knew that the farmers of Vermont could not buy nitrogen in that way. Well, taking those experiments altogether, in about three-fourths of the cases the corn responded well to the phosphate and in about half the cases it responded well to the potash; in others, it did not give any special response. A number of other experiment stations also conducted experiments with the special view of testing this question of the relation of corn to nitrogen. What was the outcome? The corn responded to the cheaper mineral fertilizers and refused to respond to the nitrogen, in almost all cases being able, as it showed by its own action, to get the nitrogen for itself either from the soil or the soil and air both. My own belief is, as I said before, that it got some from the air. Taking the experiments as they came, in one State and another, on all sorts of soils and in many places which were not fitted for corn at all, the average produce with $7.50 per acre of superphosphate and potash salt was 43 bushels of corn and a corresponding quantity of stalks. All they had to buy was the mineral fertilizers—nothing else put on at all—and that corn gathered its nitrogen for itself and had on an average 60 pounds of nitrogen in the 43 bushels, which if bought at ordinary prices would have cost from $12 to $18. If that corn is put in the silo and fed out, you have the nitrogen to make the protein of the beef, and you have a lot left in the manure to put back on the land for corn and other crops. But to be exact, I will read you a summary of these experiments:

1st. Corn has succeeded excellently with the cheap mineral fertilizers and paid little heed to nitrogen, thus acting more like clover than wheat, more as a "renovating" than an exhausting crop.

2d. With a mixture of three hundred pounds of superphosphate and one hundred and fifty pounds of muriate of potash which costs $7.50, the average produce has been, in good seasons and bad, and on soils in nearly every case "worn out," forty-three bushels of grain beside stalks. Better mixtures could doubtless be made than this—*i. e.*, mixtures fitted to special cases.

3d. Much better results have been obtained when the artificial fertilizers were used with farm manures.

4th. The corn plant thus seems to be able to shift for itself and get on very well with the aid of the cheap mineral manures, getting its nitrogen from natural sources (part of it, very likely, from the air, though this is not definitely determined).

5th. With nitrogenous manures the yield has been increased, though generally not enough to pay the cost.

6th. With mineral manures it has gathered large quantities of nitrogen to be used for fodder, and in part returned to the soil as manure for other crops.

7th. By growing corn in this way, making ensilage, feeding the latter with cottonseed meal, two points are gained.

*a.* A cheap and most excellent feeding mixture is obtained for stock.

*b.* Large quantities of rich manure are made to enrich the soil for corn and other crops.

These results were from experiments made by the farmers themselves and numbers of the best ones were made by small farmers who earned their living by the labor of their own hands. I think that enough was done to show that the corn, our great cereal, is allied rather to the clover than to the wheat; that it is a renewing rather than an exhausting crop. Certainly, in almost every case reported, it did act in that way. Somehow or other, it succeeded in getting its supplies of nitrogen from natural sources, provided only that you gave it enough of the cheaper mineral manures.

If, then, we possess in maize or Indian corn a plant which can be started without heavy cost, may we not convert our waste lands into beef factories by way of the silo and by way of systematic work? The soil is a laboratory, no longer a mine; and we may learn how to feed it so as to keep it in its most productive condition at the lowest cost, exactly as we may learn how to feed an adult man so as to keep him in the most productive condition at the lowest cost. And if we can reduce the feeding of man to a science, chemically and physiologically, we can surely reduce the feeding of a beef "critter" to a science.

Mr. Le Grand B. Cannon then said: It almost seems a matter of impertinence for me to attempt to discuss any question relating to the economy of a diet for animals in the presence of gentlemen who have made these careful and scientific experiments. I can say that my friend Mr. Atkinson, with his usual zeal, has attempted to make me a sort of practical organ to develop not a few of his theories, and I should be very willing to continue to do so, but it seems to me that I have spent about enough money already in achieving his practical results. I may say that five or six years ago when I had my herd of short horns, they were giving me a great deal of anxiety and I went to England almost entirely for the purpose of learning the mode in which they treated their cattle there, and especially the diet they fed them. After going about among the principal breeders in England I found they had no system whatever, although they had attained such a marvelous excellence in breeding. About the only result I got from all my enquiries was that they gave the animals all they would eat. We can do that on this side perfectly well. But they did not know the cost of it and I found no one in this country who could tell me, reduced to dollars and cents, the cost of raising a pound of beef. So in the absence of this knowledge, I found the only way was to try it for ourselves. I instituted a series of experiments by taking 100 steers—or rather, to be more exact, I took 93—two and three year olds, and divided them into three lots as near as might be alike in quality and weight. These were all weighed carefully in the month of November, One-third of these were treated as the average New England farmer treats his animals, which is a kind of loafing life merely to carry them through the winter and to see that they simply exist. Mine were rather better treated. They were put into a yard and their shelter was an open shed. Another lot was put into a warm stable in stanchions, and the third lot was also put in an equally warm stable and equally well provided for in that way. The first lot was fed 18½ pounds of chaffed hay—excellent Vermont hay—and 3½ pounds of grain a day, the mixture consisting of about equal quantities of Indian meal and bran—excellent bran, not this new-fashioned stuff. Another lot was treated with the same quantity of chaffed hay and a peck of mangolds and the same quantity of grain, and the third lot with 70 pounds of ensilage a day and the same quantity of grain. These animals were weighed every month. I may say that the diet is charged at $10 a ton for the hay, $17 for the bran and $21 for the meal. We assumed that the hay was worth that on the farm because we got back our manure, which reduced it. In the month of April a purchaser came—a beef buyer—and we sold him the animals. He was to select such animals as he pleased at six cents a pound on the foot at the farm. The relative gain in weight was 5¼ per cent. on those that were under the shed, 9 per cent. on those that were in the stable and fed on mangolds and 11½ per cent. on those fed on ensilage. The buyer took every one of my ensilage animals without an exception and he took two-thirds of those others that were in the stable, and he would not give me five cents a pound for the balance. So that I made a gain of 11 per cent. on the ensilage in weight and 20 per cent. in quality. I may say that we carried out this with a view not only of determining the nutritive qualities of this ensilage, for we practised it when we had short horns, but the great object was to determine its digestive qualities, and how far the temperature of the animal was uniform. We found that the temperature of the animal, for we introduced a registering thermometer, kept perfectly uniform. It ran right straight through without a break, whereas with the others it was dodging up and down all the while, showing in many instances an impoverishment of the blood. This proves that the digestion, so far as the bovine family was concerned, was absolutely perfect with ensilage. The following year I abandoned this New England way of treating them and put them into two lots, and I continued it the second year with an equal result, until I abandoned entirely the use of hay and we have fed our animals or steers exclusively on ensilage. I have carried it on for three or four years with these results. Now, to come to the absolute question of cost. The first year, on the basis that I told you of values, the animals that were fed under the shed cost me 18½ cents, per capita, a day. There is no guess work about this; everything was weighed and measured. The animals fed on the hay, mangolds and grain cost me 21 cents a day, and the ensilage animals cost me 14⅘ cents a day. So I got the largest gain at the minimum cost all the way through. It is proper to say that I charge the ensilage at $2.50 a ton, which was the full cost. In making up the cost of ensilage I did not charge against that crop all the manure I put on the ground, because I do not repeat the corn crop on the same land. It is seeded down after I get the corn crop. I never have bought any manures. Every particle of manure used on the farm has been the product of the farm. Last year all of the steers were fed exclusively with ensilage with the same results and we had no difficulty in getting on with them. The cost of my animals last year was $30.25 a head in the month of November—two and three years old, probably four-fifths of them two years old. I sold these animals in the last of April and they averaged me $68.73—that was the cost of wintering them. Mr. Atkinson had written to me to back him in his statements that we can produce beef with more profit in the East than it can be produced for in the ranches of the West. I was not able to quite stand by him, because I have bought them of a certain age. I only know this fact—that people in Wyoming come into the State of Vermont and pick up our yearlings and carry them to Wyoming and send them back to us, and I do not think these Vermont fellows raise these animals for nothing. What it costs to produce an animal from a calf to a two-year-old is something I cannot undertake to answer, but I am very strongly of the opinion, now that the professor has proved that we can go on and raise corn and take up the free nitrogen from the atmosphere, we will beat those Western fellows dead sure. That has been our trouble. But I am entirely persuaded of one thing, we cannot restore our land in the East unless we do more plowing, and the plow certainly can be used profitably wherever we can get a crop of ensilage. There can be no doubt about the economy or the healthfulness of ensilage, so far as applies to the raising of steers. So far as sheep and horses are concerned, that is another question, and whether it is valuable for putting into butter is also, may be, an open question. There has been too much claimed for it. I think both of those two gentlemen will admit that its fattening properties do not amount to much. You have got to use concentrated food if you raise fat cattle for the market and nothing will do that better than corn. That is about all I can say to you about this question of diet. I am entirely satisfied with the results of my experiments, for I believe I have done better than anybody about us.

Mr. Atkinson, by special request, then gave the details of the construction and working of his cooking machine. In order to protect the general public from extravagant charges, Mr. Atkinson has applied for a patent for this invention, and therefore requested that his remarks on this subject should be withheld from publication.

The "Farmers" then adjourned.

# The

# "New York Farmers"

MET again on February 18th, 1886, Mr. F. R. Rives presiding.

Mr. Rives said: Our attention to the subject of discussion this evening—" Poultry,"—was awakened by the statements of the distinguished statistician at our last dinner that the value of the eggs alone of this country was about one hundred millions of dollars or in other words, twice the value of the annual production of silver, and that the value of the eggs and poultry combined is more than the annual value of the silver, the pig iron, and the wool produced in this country. Another circumstance which, I think, awakened an interest, was the holding of the recent exhibition in this city of poultry, not only of all the distinct varieties of European and Asiatic origin, but of breeds originating in this country, now perfectly distinct, and having acquired the power of reproducing their like—and this notwithstanding the prediction of an author about 36 years ago when the Plymouth Rocks first came into notice that in a short time they would be sure to revert to one or other of the parent races from which they had come. Making due allowance for a tendency on the part of our people to overestimate their productions, I think there is no doubt that some American productions are far better than the European. A distinguished Attorney general of the United States used to enumerate among these superior American productions, thunder and lightning, trotting horses and pretty girls. I think the day is not far distant, if it has not already come, when we may add to the list American poultry. I have the pleasure of now introducing to you Mr. Philander Williams, of Taunton, Massachusetts, who is President of the Agricultural Society of Bristol County, and also of the American Poultry Association. He finds great relief from the exacting cares of business in turning his observation to the habits of the feathered tribe.

Mr. Williams said: Gentlemen, the subject selected for discussion by you this evening is one of the most important industries of the country, and it is well that gentlemen like yourselves should spend an hour in endeavoring to learn how to manage this great and growing business.

Until within a few years poultry has had but little attention. They have had poor houses to shelter them and have been allowed to scratch for a living. How absurd when we think that every family in the land must have eggs for the cooking department and that the better classes of people depend so largely upon poultry for the table!

It is not strange that at last many of the business men of the country have become willing to invest capital and devote time and skill to a product that is paying and always finds a ready market.

The poultry raisers of this country and also those of the world are divided in two classes; those that raise poultry for eggs and market, and those that raise it for a hobby or fancy, and the great question at the present day with the former is how to raise poultry and eggs in large quantities. How can I keep thousands of hens and make it profitable? I wish I could say it is easily done, that it requires no practical experience, that all you have to do is to buy your stock and put it into decent quarters, get a car load of grain and tell your hired men to raise 5,000 chickens.

Did you ever know a young man to invest his capital and start in mercantile pursuits without first serving as a clerk or having a fair knowledge of the business and succeed? Do you expect a young man to succeed in a profession or arrive at any degree of eminence without devoting much time and study to it? To raise poultry for market requires as much knowledge and skill as any other pursuit, and hence so many failures. My advice is to begin small or with a few and as you learn increase the number.

Say take 25 hens and give them a house 15 by 12, with good ventilation (this ventilation is one of the most important things), and, if possible, give them a natural run and learn to feed properly, and if they don't give you good returns for the amount invested, then I labor under a mistake.

If you wish to keep more than 25 have another house and keep the same number in it. If you succeed well with this number, then keep more in the same quarters, and then if they pay and are healthy build larger houses and put 50 hens in them. Study their habits. Learn by experience whether it is better to keep them indoors in extreme cold weather or wet weather or to let them run at large. There are some breeds that will bear confinement better than others, but all breeds do better if given their liberty.

In the past few years many incubators have been invented and put upon the market, and this is in keeping with other inventions and improvements, and I fully believe that the time is fast approaching when incubators will come into general use, and that every well-conducted farm will have its incubators and brooders to hatch eggs and raise chickens as well as its mowing machine or reaper. Do I hear you ask which is the best incubator in the market, and can they be run successfully?

I believe nearly all manufactured will do the work after you learn how to run them. Some men and women will succeed, while others will fail. showing that it requires skill and brains to run an incubator. I believe a brooder is better than a hen to raise chickens in cold weather because they can run in and get warm and out again at their pleasure, while a mother hen might refuse to brood her young when they need it.

Thus, you see, to keep poultry and make it pay requires some study and knowledge as well as any other business, but if properly conducted it will pay. I believe if properly managed each hen so kept will pay a profit of from $1.50 to $2.00 per head annually.

I have said that there are those that raise poultry for fancy or a hobby, and it is to this class that the speaker belongs.

I did not have to cultivate a fondness for animals, and one great incentive in my legitimate business or ambition has been to make money, so that I could have conveniences to keep my feathered pets and enjoy them, and there are thousands of men in this country that belong to this class.

We have our American Poultry Association, well officered and managed, with a good balance in the treasury. We have our American Standard of excellence and the American Poultry Association hold the copyright. We have our poultry exhibitions and our judges, and all this we do because we enjoy the pursuit of breeding fancy poultry, and do not do it to make money.

But while it may be said we are purely selfish in this matter the whole country has been and is reaping a benefit from us by introducing pure bred poultry, and crossing it upon the native breeds.

A few years ago I asked a few of the dealers in eggs in Boston market if they had noticed an improvement in the size of eggs. They said they had seen a marked improvement; and it is also so in the dressed poultry.

Many years ago a gentlemen wrote Mr. Williams "you are a public benefactor." And thus you see that while there are those that raise poultry for a hobby, or because they are fond of them, they are improving to a great degree the eggs and dressed poultry of the country. I shall be pleased to answer any questions that may suggest themselves to the gentlemen present.

Mr. Clift: What food produces the most eggs?

Mr. Williams: With the Asiatic breeds or the large breeds, it won't do to feed too much corn. Corn, as you all know, is very fattening and they get too fat to lay and wheat, buckwheat and shorts or middlings are the best to produce eggs with that breed. Leghorns you cannot feed too well. It seems to be natural for them to lay, and you cannot feed them too much corn. Plymouth Rocks will bear more corn than Asiatics. Particularly light Brahmas, if you want them to lay in the winter months, must not be fed much corn.

Mr. Clift: Is there anything in feeding warm food in the winter in making hens lay?

Mr. Williams: I don't think so. A hen that lays is a very active animal —is constantly awake and alive. Still, boiling your grain or scraps of any kind in cold weather when there is snow on the ground, and giving hens warm food in the morning is a very good idea. I do not think they will produce any more eggs than if you did not feed it, but in order to keep them from mischievous habits, I think it is well to give them one meal of warm food.

Mr. Otis: What is your experience as to the best average fowl to keep for eggs and table use?

Mr. Williams: I say frankly and candidly, I think the Plymouth Rock comes nearest to being the practical fowl of the country than any other one we have. I would take Brahmas if I could have them small size, but we get them too large, and they won't lay till seven or eight months old while the Plymouth Rock will lay when only five or five a half months old.

Mr. Swan: Do you believe in cracking corn to feed them, or in feeding it whole?

Mr. Williams: I would not crack corn. If I had growing poultry I would feed them full corn at night—give them all they can eat before they go to roost.

Mr. Otis: Have you had any experience of Plymouth Rocks crossed with the game?

Mr. Williams: No, sir; I never have. If I was going to cross a game with any variety, I think I should take an Asiatic.

Mr. Rives: The Plymouth Rock in its origin had some game.

Mr. Swan: How do you treat the young from the day of hatching to the end of the third week; as to running about in the grass, for instance, in the early morning?

Mr. Williams: For the first 24 or 36 hours, I should not feed them at all, and then for the next 24 hours, I should feed the yelk of hard boiled egg. Gradually, I would feed what we call "dough," that is, corn meal mixed with water. I should not cook it at first, and I should keep them shut up in the morning until the dew was off the grass and then let them out.

Mr. H. S. Babcock was next introduced and said:

The subject to which I would invite your attention this evening is "The Future of Poultry Breeding in this Country."

You are doubtless familiar with its past. Its history has been a strange one, a chapter full of glowing expectations, bitter disappointments, hard struggles, and well deserved successes, until to-day it ranks as one of the most important industries of this country. It is not my intention to repeat the hackneyed statistics by which it is shown that the poultry products exceed in value those of wheat, hay, corn, cotton, etc., nor do I intend to refer to the fact that the value of the eggs alone greatly exceeds the domestic output of our silver mines. You know all this as well or better than I do. And we can take these facts for granted, but it will be of interest briefly to trace the growth of this industry to its present magnitude in order the better to gain an outlook from which its future may be viewed.

Fowls, doubtless, were brought to this country with its early settlers. They were anything and everything—what we now correctly denominate mongrels. They spread with the advancing waves of population into the various portions of our country. People tolerated them as necessary evils. Fresh eggs and tender broilers were appreciated even by the descendants of those grim Puritans who objected to bear baiting not on the ground that it hurt the bear but because it amused the spectators. They could eat dainty food with a solemn face but a smiling stomach and be thankful for it. The fowls they thought needed but little care; at any rate they received but little care. They believed in respect to poultry in the principles subsequently announced by Sairey Gamp respecting nursing. "Sick folks don't need much care, and at any rate they don't get it." They were fed when it was convenient and when it was not, they foraged for themselves or went hungry. They roosted where they could, on the reaps of the ox cart, on the carriage top, on the horses stalls or in the trees. They were light of body, active of limb, and expert in the use of their wings. They could fly well, roost high and demonstrate to the satisfaction of everyone that a hen was "a scratching animal." Owing to the slight expense of keeping them, they were doubtless profitable, although as layers they were not to be commended. The exposure to which they were subjected made them tough and hardy, and taken all in all they were well suited to their environment.

But suddenly a great change took place. A hen used only to be a hen, "only that and nothing more," but with the advent of the Shanghai about 1847, now nearly 40 years ago, a hen was a hen and something more. In her, the people discovered "the promise and potency" of unheard of wealth. The crow of the Shanghai was the Aladdin's lamp which brought visions of princely fortune. It was sweeter music to their ears than the sound of battle to the ears of the war horse. People longed to possess some specimens of this fowl, which was popularly supposed to lay two eggs every day and three on Sunday. This sounds like exaggeration, but Richardson, a noted English writer soberly said: "This gigantic bird is very prolific, frequently laying two and occasionally three eggs on the same day," and this opinion being challenged, he referred to the Rt. Hon. Mr. Shaw, Recorder of Dublin, Mr. Walters, Her Majesty's poultry keeper, and J. Joseph Nolan, Esq., of Dublin, as his authorities for making this monstrous assertion. Shanghais were multiplied to meet the demand for them. Importations were made from England and Ireland as well as from China, and still the people, like Oliver Twist, cried for more. All sorts of fowls were brought into requisition, and the motley army reminds one of the nondescript procession of vehicles which are called into service to convey passengers in the country when a circus comes into town. But all were Shanghais or sold for such. All were imported, if only from the backyard of Smith into the backyard of Jones. Eggs increased in price. At first, two dollars a dozen was thought sufficient until at last 12 dollars a dozen was the regular price. And so glad were people to get eggs even at this price that they actually waited in the parlors of breeders while the hens laid them. The price of fowls advanced in a corresponding ratio. Eighteen dollars was thought an enormous price at first for a pair, but 50, 100 and 500 dollars were soon afterwards realized.

The excitement was stimulated by poultry exhibitions. The first poultry exhibition was gotten up by one Dr. C. Bennett, and held in Boston in 1849 or 1850. Later came the famous poultry show of Barnum in this city. People went to these exhibitions and returned infected with the fever themselves, and gave it to others until the whole country became a general hospital. But in a few years the bubble broke; the hen fever was a thing of the past. It had disappeared, but it left some valuable results behind. The Shanghai blood had been introduced into the fowls of the country and their size was increased. With it also came quieter dispositions which rendered the fowls more pleasant to have about. The Shanghai was a really prolific fowl, and the egg production was materially increased. The exhibitions became permanent institutions and served to keep alive an interest in poultry. This was a comparatively feeble but healthy interest and was unlike the unhealthy interest which had preceded it. But there was a period of comparative languishing until about 15 or 16 years ago a new factor appeared in the poultry press. These publications came into being at the right time. They were needed. They met a felt want and they were therefore supported. They have flourished and helped to educate the public into a proper appreciation of poultry. They have shown the needs of the fowls, pointed out the methods of supplying them, proved the profit to be realized from keeping them, and generally have exerted an educational influence upon the people concerning the subject of poultry raising. From the appearance of the poultry press we may date a steady and constant growth in poultry raising until it has assumed its present large proportions.

At no time in our history has there been so widespread and general an interest in poultry as there is to-day. One of the most convincing proofs of this interest is the fact that a very large number of people are engaging in it as an exclusive industry. Poultry farms are multiplying. Capital is seeking investment in poultry raising. I do not need to remind you of the large establishment on Long Island, where $60,000 are invested; of the great establishment in California where chickens are to be produced not by the tens or by the hundreds but by the thousands and tens of thousands; of the many smaller and yet considerable establishments where capital is realizing 16 to 20 per cent. above expenses. Ten years ago, such poultry farms existed only in the imagination of some enthusiast; to-day they are realized and profitable facts. And with the multiplication of these large poultry establishments, there has been a very great increase in the number of small ones. Almost everyone who has a few feet of land to spare keeps fowls.

The demand, too, has gone forth for better fowls. The day of the mongrel fowl, as of native cattle and nondescript sheep, has past. Its sun has set and will never rise again. Thoroughbreds or high grades must be had. The dairyman must have his Jerseys, the beef grower his Short Horns, the wool raiser his Merinos, the producer of mutton his South Downs and in the same way and to the same extent the poultry raiser demands his thoroughbred fowls.

Better stock of any kind, and fowls are no exception, means better care and better care results in increased profits, when managed with business tact and on business principles. The result of this multiplication of thoroughbred fowls is seen in the well-constructed poultry houses, the many appliances for feeding and watering, the more systematic care in making and rearing, which are found wherever we may go. The land is dotted with such houses and divided into yards filled with thoroughbred stock. Strange as it may seem, the high prices which were realized 40 years ago when the country was in a state of unprecedented excitement are more than equalled to-day. Ten, 20, 50 dollars are often paid for a single fowl and as high as 125 or 150 dollars are occasionally realized here, while our English cousins do not allow their placidity to be ruffled at 500 dollars for a game cock. And yet there is no unusual excitement; the interest in poultry is healthy; there is no raging hen fever to be treated. Many birds are annually sold at your great exhibitions, were sold last week, at very high prices.

Such is the present status of poultry raising, but what of the future? Will interest increase or diminish? Will the era of high prices continue?

Will poultry production assume any new phase or phases? These are the questions we wish to consider and find an answer for. I can only speak of the probabilities—it would be unsafe to make positive predictions. I do not believe the interest in poultry will diminish. It has been years in growing to its present dimensions. Its growth has not been a feverish but a healthy one. It rests upon a solid basis. Eggs and flesh are demanded and will continue to be in demand so long as human appetites need to be satisfied. Great as is our present production, it is less than the present demand. For years, we have been importing eggs in increasing quantities, and while we have been increasing our production, the demand has constantly outrun the supply. Although statistics are tedious, allow me to call your attention to a few very briefly. We imported in

| | | | | | |
|---|---|---|---|---|---|
| 1876 | 4,903,771 | dozens. | Valued | at | $630,393 |
| 1877 | 5,048,271 | “ | “ | “ | 617,622 |
| 1878 | 6,053,649 | “ | “ | “ | 726,037 |
| 1879 | 6,022,506 | “ | “ | “ | 646,735 |
| 1880 | 7,773,492 | “ | “ | “ | 901,932 |
| 1881 | 9,578,071 | “ | “ | “ | 1,206,067 |
| 1882 | 11,929,355 | “ | “ | “ | 1,808,585 |
| 1883 | 15,279,065 | “ | “ | “ | 2,677,604 |
| 1884 | 16,487,204 | “ | “ | “ | 2,677,360 |
| 1885 | 16,098,450 | “ | “ | “ | 2,476,672 |

And this is the way that the poor overworked, American hen has to compete with the pauper hens of other lands where the glorious doctrine of protection has never been preached. How long this state of things is to continue before she claims her rights before the law, holds a hen convention, and instructs legislators to afford the needed protection we cannot foresee. It is to be noticed that in the last 10 years, our importations of eggs have increased from 4,903,771 dozens, to 16,098,450 dozens, and the value from $630,393, to $2,476,672, or in round numbers, our egg imports have nearly quadrupled. Our population has increased in five years in round numbers from 49,000,000 to 55,000,000 or about 12¼ per cent. The increase for 10 years at the same rate would be about 24½ per cent. While our population has increased about 24½ per cent. our importation of eggs has increased nearly 400 per cent. But, as we have already said, our production has greatly increased within the same period, so that the consumption must have increased more than 25 times as fast as the population. Should this state of things continue, we should never be able to supply the home market and would therefore always to a certain extent be dependent upon foreign production. At first sight, therefore, it would appear that the era of high prices would continue indefinitely.

We scarcely expect this to be the result. A steady and growing demand will increase the supply. It will take time to do this, but the future will see poultry farms multiplied until the demand for poultry products is met. At the present time, there is no business which will yield so great profits for the amount of money invested as poultry raising. This fact will lead many men into the business until at last, as has been the case in all other branches of business, the cost of production will regulate the price of the products. We may hopefully look forward to a time which if we do not ourselves see, our children or grandchildren may, when what was once regarded a luxury and could only be affored by the rich, will be considered a necessity for the poor, when eggs and chickens will become staple articles of diet upon the table of the laborer as well as upon the table of his employer. Such has been the history of many articles of diet. It is not so very many years ago, when sugar, tea, coffee and others articles were regarded as luxuries, but to-day there is scarcely a household in the land where they are not found upon the breakfast table. We feel that we are not straining our imaginations in foreseeing the general use of poultry products by all classes made possible through greater production and better methods.

But how is this to be brought about. Two ways are possible. The first we have already indicated by keeping greater numbers of fowls. This is the way which will be earliest employed. Those who keep 10 will increase their flock to 50 or 100; those who keep 100 will provide accommodations for 500 or 1000. New poultry keepers will swell the ranks and in towns where there are 10 men engaged in poultry raising there will be 50 or a 100 devoted to this pursuit. We see present indications of this, and we expect to see in the near future greater numbers engaging in this healthful and lucrative business. This method will serve for a time, but eventually the second method will be called into service. Better fowls will be produced, those which will lay a greater number of eggs in a season or will produce the greatest amount of flesh for the least expenditure of money. Just as close competition in manufacturing produces better machines for doing the work, so that the power loom supersedes the slower hand loom and reduces the cost of production, so better breeds of fowls will be demanded, which will lower the cost of production of eggs and meat. Something has already been done in this way in our own country. The Plymouth Rock was made, and as it has proved to be a quick growing, hardy and productive fowl, it sprang into popularity. Later, the Wyandotte appeared, and as it was suppossed to possess similar merits to the Plymouth Rock, it achieved popularity at a bound. The Leghorn had proved itself a very useful and profitable fowl, but complaint was made that its comb was liable to become frozen, and when frozen. the fowl ceased to be profitable—it would not lay—and a rose comb was engrafted upon it. And later, the Plymouth Rock has been improved by changing its single for a pea comb. This comb, fitting closely to the head, and in the females being very small, is practically exempt from the attacks of frost. This fits the hens for winter layers, enabling them to produce eggs when eggs are scarce and command a high price. This we regard as no small triumph of the breeders' art, to combine the many useful qualities which the Plymouth Rock possesses with a comb that can bid defiance to zero weather. It is just such improvements as this that we expect to see made in the future when competition has reduced the price of products and made reduced cost of production indispensable to a good profit.

This is a fascinating field to the breeder, full of grand possibilities, but beset with numerous difficulties. He sees in his flocks slight variations from year to year. These he can make use of, until in a long series of years, the accumulation has transformed the character of his fowls. There are also sudden and great variations, and these are seized upon by the intelligent breeder as means of creating new breeds. Then there are crosses to be made, producing some chicks like one parent, and some of an intermediate type. The latter, if of a type which he wishes to perpetuate, are selected for breeding purposes, and then comes the long struggle with the law of reversion. It requires patience and time to overcome the effects of this law, but it can be done, as it has been in the case of the Plymouth Rock and the Wyandotte, the Crevecœur, Houdan and La Fleche. There is much the same interest attaching to the making of a new breed as there is to the raising of seedling roses. It is not possible to foresee exactly the results, but if success comes in a solitary instance it more than compensates for the many failures. If a new breed is established which cheapens the cost of production of either eggs or meat, the maker has conferred a benefit upon the public. If the man who makes two blades of grass grow where but one was formerly produced is a public benefactor, certainly the man who produces a better variety of fowls is to be so regarded. Not only will useful breeds be produced, but utility will clasp hands with beauty in the production of ornamental varieties. Man is born with a love of the beautiful. This faculty finds expression in a thousand ways. Why do we, for example, employ skilled architects to design our houses with columns and battlements, with pinnacles and towers? A shed would shield us from the storm and the cold. Why do we call into service decorators to adorn their interiors with frescoes and tinted walls, hangings and draperies? Plain mortar would keep out the wind and the rain. Why do we hang the walls with the glowing colors of the artist and fill the niches with the chiselled marbles of the sculptor? Why do we, when we make choice of living creatures, select a horse with clean, flat limbs, a beautiful arching neck, a finely cut head, a bold, prominent eye, a flowing mane and tail, and a movement that is the very "poetry of motion?" He will draw no heavier loads and traverse no longer distance than a veritable "plug ugly," with round, post-like legs, roach back and stumpy tail, whose drooping head and listless attitude make him in appearance no mean rival of the fat boy in Pickwick. Why but to gratify our love of the beautiful? Every article which we possess and use, from the daily household utensils to the most famous public building, is designed with the intention of ministering to this universal need of human nature, this love for beauty. And is it forbidden that our fowls should be beautiful, too; that they should possess forms of grace and be clad in radiant colors? Ah, no! In them we find beautiful combinations of colors that the painter can but feebly imitate, and when we look upon them we are forced to confess

"The course of nature is the art of God."

In the breeding of all fowls, and especially of the ornamental varieties, there is an indescribable pleasure. Not only do we rejoice over their beauty, but we feel that by our intelligent matings, we have helped to create that beauty. We have guided the hand of nature as she laid on the colors; we have directed the sculptor as he chiselled the perfect form. The rapidity of reproduction in comparison with mammals enables us to make numerous experiments in breeding fowls. What effect will this mating have upon color, or of that upon figure? What relation does food bear to the color of the plumage? What is the relation of the color of eggs to the plumage of the hen which lays them? These questions may lead us to seek for their answer. Then there is the pleasure to be derived in watching the constant change from the first downy covering to the matured plumage, in observing the peculiar traits of character exhibited, in studying their aversions and likings, their hates and their loves, their gallantries and their rivalries, their various methods of expression and communication. The poultry yard, to the careful and observing student, is a miniature world from which no end of innocent pleasure as well as useful instruction may be drawn.

And in this connection we must call attention to the work of the American Poultry Association—an organization made up of the leading poultry breeders who have issued a standard of excellence. This work affords a common ideal for all breeders of poultry. It is not expected that their fowls will be exactly in conformity to its requirements but that it shall hold up something ever in advance of attainment. The advantages of such an ideal are obvious. It unites the efforts of poultry men. It leads them to adopt a common type, so that a Plymouth Rock in Massachusetts shall be like a Plymouth Rock in California, so that a game in Maine shall possess the same characteristics as a game in Florida. Without such an ideal, there might be as many types as there are breeders. A, might prefer a long tailed game, and B a short tailed one; C might choose a low tailed bird, and D a high tailed one. But with a common standard, there is a unity of purpose. The effects of this standard are now visible and will be more apparent in the future than now.

But will poultry keeping assume any new phases? We feel safe in saying that we believe it will. It is already doing this. Last year, there was one exhibitor of eggs at the Madison Square Garden show. This year, there were nine. The exhibitor last year engaged customers for his eggs to be supplied weekly at 50 or 60 cents a dozen. This year, others have done the same thing at increased prices. It is but a few years ago when butter was merely butter. It brought about 20 cents a pound in summer and 30 cents in winter. Now, butter is quoted according to quality, from the lower grades that bring 15 or 20 cents a pound to the higher grades which bring 50, 60 and 75 cents or more per pound. The same grading of eggs will be made, and quality will be the basis of price.

Another new phase of the business of poultry raising will be in the production of better table poultry. Fowls will be fed with special reference to their edible qualities and those which produce the most meat upon the most desirable parts, and produce meat that is the tenderest and best flavored will command the highest price. There will be many grades of poultry offered with prices varying according to quality. Capons will be produced in greater numbers. Caponizing is but imperfectly understood in this country and but little practised. But we believe the day is not far distant when not only

"The justice
In fair round belly, with good capon lined"

but many others, successful business men, legislators, railroad kings and all who can afford such a luxury will be found with a similar lining. The law will not have a monoply of the good things. It has been altogether too much so in the past, but when our American Shakespeare shall be born, he may select other classes to dignify with the descriptive epithet "capon lined."

The business of raising broilers can hardly be said to be a new phase and to belong to the future of poultry raising. It is already prosecuted to a considerable extent but with the perfection of incubators, we may expect it to assume much greater proportions in the future than it has already attained.

Such, gentlemen, is the future of poultry breeding as it appears to me. The business will increase in magnitude to meet the increased demands, competition will eventually become closer which will result in improved breeds of fowls, the cost of production will regulate the general price, while quality will become an important factor in establishing the price of the best grades of goods, and the laws of political economy of supply and demand and division of labor will be operative in this as in other kinds of business. It is a hopeful outlook. It promises much for the near and more for the distant future. It sees the luxuries of the rich becoming the necessaries of the poor. It discloses healthier and happier circumstances for the mass of mankind. It opens fields of pleasant and healthful labor in supplying the food markets of the world. It is a picture that we, as men and lovers of our kind, in whom

"One touch of nature makes the whole world kin,"

may contemplate with unalloyed satisfaction, and may, if we are so disposed, help to make real. I have tried to confine myself to plain and simple statements of fact, to give no roseate hue to the clouds that veil without concealing the future, to indicate without exaggeration the probabilities of the future of poultry breeding in this country. How well I have succeded in this task I must leave to you to say. I desire to thank you for your courteous attention, and while I may have presented nothing new upon this subject, I indulge the hope that I may have brought to your attention old truths that will bear a new examination.

Mr. Choate and Mr. Dinsmore closed the proceedings with some humorous remarks, and the "Farmers" adjourned until the 16th of December, 1886.

# Proceedings

# of the

# New York Farmers

SEASON 1886—87.

---

PRINT
GLOBE STATIONERY AND PRINTING CO.,
89 Liberty Street,
New York.

# MEMBERS.

Dr. Cornelius R. Agnew.
Mr. Daniel F. Appleton.
Mr. John S. Barnes.
Mr. Fred. Billings.
Mr. J. Nelson Borland.
Mr. John Borland.
Mr. Frederic Bronson.
Mr. George H. Brown.
Mr. James A. Burden.
Mr. Le Grand B. Cannon.
Prof. Charles F. Chandler.
Mr. Joseph H. Choate.
Mr. Smith Clift.
Mr. Samuel J. Colgate.
Mr. Erastus Corning.
Mr. Alfred B. Darling.
Mr. Chauncey M. Depew.
Mr. William B. Dinsmore.
Mr. William M. Evarts.
Mr. Theodore A. Havemeyer.
Mr. Robert Hoe.
Mr. John J. Holly.
Mr. Adrian Iselin.
Mr. John Jay.
Mr. Charles Lanier.
Dr. J. Lawrence Lee.
Mr. Johnston Livingston.
Mr. Pierre Lorillard.
Mr. J. Pierpont Morgan.
Mr. James Otis.
Mr. Henry E. Pellew.
Mr. George B. Post.
Mr. Frederic A. Potts.
Mr. Percy R. Pyne.
Mr. Francis R. Rives.
Mr. F. Augustus Schermerhorn.
Mr. James O. Sheldon.
Mr. Samuel Sloan.
Mr. James Stillman.
Mr. Thomas Sturgis.
Mr. Rutherford Stuyvesant.
Mr. Benjamin L. Swan.
Mr. Edwin Thorne.
Mr. Jonathan Thorne.
Mr. Samuel Thorne.
Mr. William K. Vanderbilt.
Mr. W. Austin Wadsworth.
Mr. John Hobert Warren.
Mr. John D. Wing.

### COMMITTEE ON NOMINATIONS FOR MEMBERSHIP.

Mr. Le Grand B. Cannon.
Mr. John D. Wing.
Mr. Frederic Bronson.

* * *

# OFFICERS.

President, - - - Mr. FRANCIS R. RIVES.
Vice-President, - - Mr. JOHN JAY.
Sec'y and Treas., - Mr. JAMES OTIS.

Address of Sec'y and Treas., No. 22 East 10th Street.

JAMES W. TOOLEY, Stenographer.

~~A. A. 7969~~

# The “New York Farmers”

HELD their first meeting in the season of 1886-7 at the Hotel Brunswick on December 16th, 1886. Mr. Francis R. Rives presided, and in opening the discussion on the subject of the evening—“Subsoil Drainage,”—he said:

Having drained our glasses, I suppose we are all the more fortified to proceed to the discussion of the drainage of our lands and houses. It is an interesting fact that the last three prime ministers of England, in their moments of leisure, if they can be said to have any moments of leisure, have given themselves to agricultural work. The present premier, Lord Salisbury, in the country seeks a revolution of thought and feeling in endeavoring to ascertain the best possible means of harnessing electricity to the employments of industrial husbandry. Mr. Gladstone with such assiduity felled the trees, perhaps to fix his fences, that he often had an actual and perhaps occasionally a metaphorical axe to grind. I chanced to be in England during the administration of Mr. Disraeli, when there was such an abnormal and severe drought that not only the embankments and cuts of the railways were in the burned condition of the grass ignited by the sparks from the passing engines, but also the hay ricks and the grain ricks; and I will mention for the benefit of our excellent friend, Mr. Sloane, that the companies were punished by the courts in heavy damages for not using an American invention, a spark arrestor, for since Mr. Sloane has left the management of the railway company over which he presided with so much success in our part of the country, the company does not hesitate in the least bit to burn up any New York Farmer. But, to return from this digression, Mr. Disraeli at the time in a speech to an agricultural body boldly announced the doctrine that England was entirely overdrained, and that so soon as the beneficent rain fell, it was hurried off brawling to the sea, where it did no good. Now, as I understand the theory of our experts in reference to the drainage of land, it is precisely the contention of the hard drinkers in reference to the drainage of their cups—it is good alike for the wet and dry.

The importance of drainage can hardly be overestimated. I think it is not too much to say that proper systems of drainage based on science and thoroughly executed would not only enormously enhance the value of all our agricultural lands but by keeping the drinking water free and the breathing air from pollution would almost wholly extirpate two of the greatest scourges of fever that are laid upon humanity—one of a vegetable and the other of an animal origin. The word malaria—a fine sonorous Italian word—I believe in its legitimate sense signified the specific vegetable poison of a marsh, which gives fevers of an intermittent type, chills and fever, or fever and ague. A distinguished English physician, one of the Lord Chancellor's physicians, told me that he had never seen a case originating in his own country, but that from his reading he believed that the disease which was once prevalent in England finally departed the realm on the completion of the drainage of the fens of Lincolnshire. The other fever to which I referred is a fever of an animal origin, typhoid fever, more commonly called in England enteric fever. One of the older writers on the subject designated it as cesspool fever or sewer fever. Fierce and deadly outbreaks of this fever are growing in frequency with the density of our population, owing to the palpable violation of the laws of sanitary science. This it is the province of our experts to explain and, meanwhile, I know no higher authority than a gentlemen who is happily present, one who, to his great faculty for the acquisition of knowledge, unites the still rarer gift of imparting it—and imparting it in a manner marked by signal grace whether in written or spoken words, Mr. George E. Waring.

Mr. Waring then said: The emotions with which I received the invitation of your President to partake of this frugal repast, few of you will perhaps understand. It promised the fulfilment of one of the oldest and dearest wishes of my heart. My lot has been cast in the busy marts of trade. I live in the metropolis of American industry and commerce on one of its most crowded thoroughfares, in an ancient city whose sails have whitened every sea for more than 200 years. Precluded from taking myself an active part in agriculture, but feeling still that there lay dormant within me the germ of great possibilities of agricultural success, I have been obliged to content myself with observing the deeds and achievements of others. I have had my attention especially attracted to the fame and fortune achieved by the farmers whom I see before me, and have found in their success a satisfaction that I could hardly have found in any success of my own. It has been especially gratifying, to be called to meet face to face men who living on their ancestral acres have devoted their entire time to the production of two blades of grass where only one grew before, and have earned themselves the noble title of the "bone and sinew of the land." It is especially gratifying, as I said, to be allowed to come in to this agricultural region and to break bread with such an ideal collection of the horny-handed sons of toil. I noticed as I walked from the station to the door of this good old tavern, that while Manhattan Island is undoubtedly one of the best agricultural districts of the country, your tendency seems to be—rather too much perhaps—towards petty culture. It seemed that your number of farms was too much for the extent of the territory and your barns indicated a production to the acre that is at least unusual, though I had seen the same thing in Holland, whence all your forefathers came, and I judged you had only carried to an extra development the tendency that prevails in your fatherland. I repeat, in the way of introduction, that it has been extremely gratifying to me, who never was a farmer, or saw a farm or farmers, to meet on such a fertile soil such successful and noted agriculturists.

To turn more directly to the subject that I have been asked to speak about, that of "Drainage," it seems difficult to know just where to begin, because farm drainage of all subjects is the one that every man who owns a farm or has had anything to do with the farm, thinks that he knows all about, and that it is a mere matter of common sense. Therefore, it would hardly seem polite before an assemblage of this sort to speak of processes. It is to be assumed that every farmer such as you are understands how the work should be done. To speak of results, perhaps, would be more satisfactory. I happen to have been interested in farm drainage for a good long time. I began work as farm drainage engineer in 1853. In 1857 I took charge of the agricultural drainage of Central Park, and I have been interested in the general subject of land drainage without many intermissions during the whole time since. The progress, the development of land drainage has been simply marvellous. At the time when I first began work it was already more than satisfactorily established in England. More land was drained perhaps in England before 1855 than since, but it was still in this country an extremely new thing. The drainage of all the farms that I knew anything about, and most of the draining in this country was done in Massachusetts—was done with stone drains, at enormous expense and with largely temporary results. The first introduction of the use of the drainage tile by Mr. Johnson in Central Park was before my time. Its results were very marked, though not so great as would have been the case had the more modern types been used. He had formed his theories and practice from England before the modern system of under-drainage had been fully developed. Now, under-draining has overspread the whole country. I remember very well when I used to receive letters from Ohio, asking with regard to the cost of freighting draining tiles from Albany or New Jersey, and whether it would pay to use them there. In Illinois it was believed it would never be worth while to drain lands because of the very satisfactory condition as to fertility of nearly all the corn lands in that State. Now, drainage in Ohio is as common as it is here—more so, probably—and in Illinois it may be said to be almost universal. There are hundreds of miles of enormous ditches, real drainage canals extending through different parts of the prairie regions of the State, into which thousands and thousands of tile drained lands find their outlet. The development of good land for farming purposes by this process has been enormous. I believe that there are now more factories for the manufacture of drain tiles--more tile yards in the State of Illinois—than there were farms having under-drains on them in the whole United States twenty years ago. It seems to me that in view of this general and very satisfactory development of the art, it is hardly worth while to do more than speak very briefly of the present best received theories as to the processes of under-draining land.

I assume that all of you have under drains on your farms, that you have not very much land that still needs under-draining, and it is to you a matter rather of curious than it is of practical interest. The first theory that was established so far as I know was with regard to the manner in which the water gets into the drains. It was supposed it entered through the porous surface. Then it was supposed it ran down to the ends of the tiles and got in that way. But it was finally established that when rain water runs on the surface of the land it raises the level of the water in the land precisely as in a mill-pond, and when it reaches the height of the inside of the tile and finds an opening, as it does at the joints, it runs in there and flows off just as it does at the mill-dam, and that is practically the way in which water gets out of the land and gets into the tiles. Of course the descent of water through the tiles is very different from the descent of water through the atmosphere. It meets a certain frictional resistance. The regulation of the width and depth of drain must be very much a matter of the character of the soil and of the climate and the frequency and amount of rains. That is one of those things that cannot be established by rule even in a country where you know what the soil and the rain-fall are, but a very satisfactory rule of thumb has been established. If the drains are further apart they must be deeper, and it becomes then simply a question of economy, whether it is cheaper to lay more tiles in one case than the other—a question which must be decided by the cost of excavating and the subsoil. If only the first two or two and a half feet are easy digging, and very little subsoil has to be moved, it will probably be cheaper to buy double the quantity of tiles and lay them at a slighter depth, whereas if the digging is tolerably easy to a greater depth, it is very much cheaper to use fewer tiles. But these are things that have to be regulated by judgment according to the amount of water that has to be removed, etc. This whole question of under-draining has nothing to do with springs of water in the soil—that is, with the direct striking of a spring and its removal. There have been, since I have had to do with the work, great improvements in the manner of laying drains. We used to think that a drain must be wide enough for a man to work in the ditch and use his elbows. I have men now who when they are working by contract upon a four-feet ditch, fourteen inches wide at the top, dig to a depth of two feet, having a width at that point of six inches, and do all the rest of the work from the top of the bank, except the loosening. That is done by what is practically a pick, and the tiles are laid from the surface. That is where collars are used. Collars are very useful and are economical where you can have men at work in this way. But where the ditch has to be reached to the bottom by the tile layer, then I think the best covering for the joint is a small piece of calico, going twice around the tile. All you want to do with regard to the protection of joints is to keep the loose earth from getting into them. This cloth is perfectly porous and admits the water as fast as the tiles will take it.

The President suggested something which I had not at all contemplated in coming here—house drainage and the removal of waste matter from dwellings. That is a very large subject, and one that cannot be treated adequately or even suggestively on an occasion like this, further perhaps, than to refer to one general principle that seems to have been very well established in the investigations and experiments that have been made during the past fifteen or eighteen years. It is safe to say that the destruction of fœcal or any refuse matter from the house, whether thrown on the ground or mixed in the earth by an earth-closet, or whether it is disposed of in any other way where the air has a chance to get at it, is completed by a natural process that was not understood nor even recognized until a short time ago. I will tell you of one experiment that was made before the present theory had been at all suggested. I was very active at one time in attempting to secure the introduction of the earth-closet in this country. That was before any one perhaps realized that while you got rid of the offensive matter that the earth-closet was intended to provide for, yet that matter was no more offensive in putrefaction, nor was it so great in quantity as the other refuse matters of the house. The question how to provide for the removal of what is produced in the kitchen sink and wasted in the kitchen in the form of garbage, is a more serious and dangerous matter—and a more offensive one, too, except for the smell—than that of the removal of water closet matters. That, I suppose, is the reason why the earth-closet is comparatively so little used. It is a convenient thing to use under certain circumstances. It will rarely do for a village; it will never do for a town; and it will be a very objectionable thing for a house, unless well taken care of. In view of my own necessities, I had two earth-closets in my own house built in with the house, the waste being received in brick chambers in the cellars. The matter taken out of those chambers when they were filled was thrown on to a platform under cover, thoroughly dried, and used over and over again. I wanted specially to see how long I could use it, and, if I remember rightly, I did use it from 1870 to 1875 or 1876, adding a little all the time to make up for wastage, and using a little of the material for flower borders, but practically allowing it to remain the same substance. I then had the earth analyzed, and although during that time it had been saturated with the urine and fœcal deposits of five or six persons, the analysis showed that it was precisely, within very slightly changed outlines, the same as fresh-garden soil. There was no more ammonia, there was no more organic matter of any kind than you find in the same soil taken from the same place in the field that had never been used in the closet at all. That was accounted for at that time by the theory that it had been oxidized by the atmosphere. So it had, but as it now turns out, its oxidation had been due to the action of bacteria. We hear a great deal of bacteria, and we have been taught to distinguish between them. There are bacteria and bacteria; and there is now no doubt that the great benefactor of the human race, the one organism without which we could not live, is the bacteria of putrefaction, which converts waste matters into available plant food, and renews and purifies the soil. It seems to others and myself that the whole question of the nutrition of plants, the use of manure, and the economy or waste of manurial matter is going to receive a great deal of new light from a consideration of this singular process by which organic matter in the soil is destroyed. The manure that you put on your fields must be destroyed before it can be taken up by the next crop, and it is a great question whether the means of fertility do not depend as much on favoring the growth and development of bacteria as on anything else we can do. Perhaps we have practically been doing that all the time when we have been successful in our efforts to increase the production of our soils.

Mr. Henry C. Meyer was next introduced. He said: When I received a letter inviting me to attend your dinner, and intimating that I would be expected to say something or contribute something toward the discussion of the evening, I replied from Cincinnati that I knew absolutely nothing about farm drainage, but that possibly the discussion might take a range, or some question might be asked, which would enable me to say something pertinent. Mr. Rives was good enough to state that I had been engaged in solving problems. In that he is in error. For a number of years I have been engaged in conducting an engineering paper, and I have to rely on the advice of gentlemen as to what I shall print each week, and so I may have gotten the credit of knowing a great deal about matters as to which I really knew very little. At any rate I know one thing—that by following the advice of those gentlemen I have avoided a good many blunders. I know nothing about farm drainage, except that I have always had the impression that it afforded unusual facilities for draining a man's bank account, that is, unless you followed after the fashion of a German who bought a small farm in New Jersey and gave a mortgage for practically the entire amount of the purchase money. The seller supposed he would default in the mortgage and would never be able to make it good. But the man paid the interest and paid something on the principal besides, and by and by he made the last payment. Then the seller said: "I am really curious to know how you raised this money." Said the German: "Oh, I will tell you how I managed the farm; we worked from sunrise to candle light; then we saved everything we could sell, and what we did not sell we fed to the hogs, and what the hogs would not eat, we eat ourselves." That is how he contrived to make the farm pay and pay off his mortgage. But with regard to these sanitary engineering problems, I hardly know that Colonel Waring has left anything to be said. I might say, however, that I would advise no one to lease the sewage of a small town, as some large farmers have in some places done, with the idea that there might be a profit in utilizing it. You have doubtless read that the city of Pullman has a model sewage farm, and that it has proved profitable. So much indeed has been said about it that this summer I took the trouble to go there and visit the farm to see if it was conducted as a model sewage farm should be—that is to say, conducted as it would be necessary to conduct it in England or anywhere where there are local restrictions as to the collection of the sewage. But I found the farm was located some distance from the town of Pullman, with no buildings about it except those occupied by the authorities, and that it was not so absolutely imperative to deal with the sewage as it would be if the question of putrefaction was prominently before them; in other words it is conducted so as to get the largest crops and make the most money out of it, and when they cannot utilize the sewage they let it flow into Lake Calumet by the side of the road, and that explained to me how it was that it was profitable. But they do not utilize all the sewage that the town of Pullman delivers to the farm, and it is plain to me that while, as a public spirited enterprise, you might do well to take the sewage of a town and put it on the land, you would find it cost you something more than you could get back. Quoting from recollection, the cost of disposing of the sewage of Birmingham on their farm of 1,200 acres was £30,000, while the income was only about £20,000. On the other hand, the results at the Craigentinny farm near Edinburgh, have been very satisfactory as increasing the fertility and value of the land. There they have every natural advantage. The lands are right by the sea, and the sewage is led to the farm through open ditches, and then flows right into the sea. They raise Italian rye grass, and the farmers have taken the land and pay for it from as high as £25 to £40 for the year, and they usually take four crops during the season. With regard to the disposal of sewage from houses and small communities, Colonel Waring omitted to state that he himself was instrumental in introducing that system into this country. It has now come into quite general use in small communities like Orange and Staten Island. Where the land is favorable, that is to say, where it is porous and there is soddy ground for four or five feet below the point where the drain leaves the houses, I do not know of any better way of disposing of the sewage of ten or twenty people. The main trouble is that you have once in every two or three years to uncover the tiles and remove the grass roots that get into the little joints, but that is a trifling expense, and having done that, your system is all right for another period. But where the ground is clayey some other system would probably be better.

Professor Charles F. Chandler then said: Colonel Waring has left very little of the field for further discussion, and I hardly know how to add anything to what he has said. But I have had a little experience, which may perhaps be interesting. A few years ago, I bought a piece of land on the south side of Long Island, which was absolutely level, and as there was no system of sewers in that neighborhood and no aqueduct, it was a very important question to secure a satisfactory water supply and to dispose of the house refuse and the sewage, so that the local water supply should not be injured. I began to experiment, and my first experiments were total failures. There happened to be on that piece of land an old ice house, which consisted of an excavation about thirteen feet deep and thirteen feet in diameter, which was laid with brick. It was about 250 feet from the house, and it occurred to me that it would be a very good opening for sewage. So I had a bottom of brick placed in it and made it perfectly tight with coal tar pitch, and laid the brick on the inside walls with coal tar pitch, and I thought that would be a proper place for the desired purpose. Then, as I had a windmill and abundant water closets in the house, I constructed alongside of it a square tank twenty feet square and two and a half feet deep, and I put a roof over it, and I concluded that would be a proper vessel for the evaporation of the sewage, and I had all the manure from the stable and the weeds that were pulled up out of the garden put into it, and then I had the sewage pumped into it with the idea that it would evaporate, and I should manufacture an excellent compost for my soil, and dispose of my sewage. I think about three weeks had elapsed when my monstrous cesspool was full, and my evaporating tank was full also, and would not evaporate. The honest farmers of Long Island who had watched this operation with a good deal of amusement, poked fun at me, and wanted to know what I would do next. The only thing I could do was to put in a long line of troughs and pump the sewage as far away from the house as possible. That also was a failure, so I consulted the authorities and put in the system which Colonel Waring has introduced, of subsoil irrigation. I constructed adjacent to my house a tank consisting of two chambers, the first of which nearest the house served as a grease-catcher, and the second a flush tank. I put in a siphon out into the vegetable garden, and laid about 1,000 feet of drain tile just below the surface, and I have never heard of my drainage since. We have a windmill and an abundant supply of water and everything passes through the tanks. My last experiment is a complete success. We have no odor from it and no annoyance of any kind, and I believe the system of subsoil irrigation is capable of taking care of the refuse of any country residence anywhere, provided you have a sufficiently large piece of ground to receive the material.

Colonel Waring has referred to the bacteria. They are very popular just now. To many they convey the idea of diseases which are very fatal, but those who have paid most attention to them find that they are our best friends, and while a few of them are given to the production of specific diseases, the majority are devoted mainly to taking care of animal and vegetable material and converting them into material suitable for plant food. With regard to the sewage of large cities, I have had occasion to pay a little attention to that, and have arrived at conclusions which rather stagger some auuthorities. I was called on by the city of Albany to pass upon the question of the water supply for that city. The commissioners who had been appointed under a law of the Legislature to provide water were very much worried. The Hudson river passed by the the city of Albany, and furnished an abundant supply of water, but unfortunately it received the drainage of Troy, which was only eight miles above. To procure water from another source would entail enormous expense on the city. One of the water commissioners happened to be an old acquaintance of mine, and the commission concluded to put the question into my hands whether it was safe for the city of Albany to take the water of the Hudson river. I studied the matter very carefully, taking as the basis of my investigations the experience of the city of London, which receives its supply from the Thames and the river Lee, both of which drain a thickly populated district, and I finally advised the water commissioners 14 years ago that it was perfectly safe to supply to the city of Albany the water of the Hudson river, notwithstanding the fact that there was a city of 40,000 to 50,000 inhabitants that poured its sewage into it. The physicians of Albany were greatly exercised, and they predicted that the city of Albany would be visited with terrible epidemics, and a great hue and cry was raised. But the water commissioners were satisfied that it was a pure source of supply, and they erected pumping engines, and having taken the water of the Hudson river including the sewage of the city of Troy, the city of Albany has been freer from every kind of zymotic diseases than the city of Troy, which receives the water before it has been contaminated by sewage. The explanation of this rather radical proposition was not exactly understood at that time. The best authorities in Europe had stated that they had found as a matter of fact that there is a system of spontaneous purification which goes on in all running streams by which large amounts of sewage are disposed of and disappear. It was shown that there were points on the river Thames where the water was black with sewage, and yet, 12 miles below, the water was clear and sweet again, although it had received no large addition of fresh water. This was called spontaneous purification, and it remained for Pasteur and Koch and the other investigators of bacteria to explain it. It seems that all natural waters are charged with bacteria, the vocation of which is to take this refuse material and convert it into material suitable for plant food. The crucial test of bacteria is to inoculate an animal with them. These scientific gentlemen take mice and guinea pigs and in order to ascertain the virulent character or otherwise of the bacteria, they inoculate those animals with them, and if the animals fail to develop any specific disease of any consequence, it is concluded that the bacteria are harmless. The experiment in the city of Albany was made upon 100,000 American citizens and was eminently satisfactory, for they have drank the suspected water with impunity and there have been fewer cases of typhoid fever and zymotic diseases among them than in Troy or in any of the other villages up the river, so that I have arrived at the conclusion that there is no inherent danger in sewage. It was alleged that if this water was used, a typhoid germ discharged in the water at Troy would find its way to Albany and would there develop into an epidemic, but this has not proved to be the case. Of course, it is not a popular idea to advance—that it is proper to allow the drainage of cities to run into running streams, but while it is not agreeable to sentiment, experience is not against it. I have failed to find any evidence either in this country or in Europe of a large stream becoming capable of producing zymotic diseases in a population drinking out of it, even though it receives sewage. I can conceive of a time coming when the Hudson river would not be large enough to dispose by this process of spontaneous purification of the sewage that might run into it, but it is simply a question of quantity. If we have a very large river and a moderate population, there does not appear to be any actual evidence that the water may not receive and dispose of and destroy the sewage of the population. This, of course, is a very different case from the contamination of a well. In a well we have a small quantity of water which is quiet and where this process of spontaneous purification does not take place, and if we construct a well near a cesspool or privy vault, and pile up the manure heap, danger may arise, simply because the opportunities for purification are not adequate for the emergency of a local deposit of this kind. I have often been asked why we object so seriously to the privy vault in the neighborhood of a well, if the soil contains the bacteria which are capable of oxidizing and destroying filth of that character. Recent experiments at the famous farm at Rothhampstead have shown that the bacteria which appropriate and destroy this harmful matter are located entirely in the surface of the soil, so where it may be eminently proper to spread this material on the surface, it is improper to allow it to get into the soil at a depth of three or four feet, where it is beyond the reach of these organisms. These organisms are confined to the first six or twelve inches of the soil; they are not in the subsoil but in the upper strata. We may distribute by what we call subsoil irrigation this material to where we place it within the reach of this kind of bacteria and then it will be disposed of, but if we place it beneath that depth, it escapes destruction and produces disease. Further facts have been developed. It seems to be a very great question whether sewage is unwholesome in itself. Those patient Germans have actually fed themselves upon sewage, in order to see whether it was harmful. They have taken fœcal matter and sewage in the form of pills several times a day, and from the absence of any specific disease they have discovered that no harm follows the eating of it. So that, from the latest investigations, there is no reason to believe that ordinary sewage and ordinary filth from a privy vault will produce disease. But there are enteric diseases which are produced by another variety of bacteria—not the honest farmer bacteria that destroy this material and make it into plant food, but another kind that do cause specific disease—and if a person who has been suffering from typhoid fever visits a privy vault that communicates with the well, then these wicked bacteria come into action and will reproduce the typhoid fever. But typhoid fever cannot be produced by simple filth but only by the bacteria of typhoid fever, just as small pox can only be produced by the bacteria of small pox, and that is the reason why we have so little typhoid fever. It is often spoken of as a very serious scourge, but really we have very little of it. I think it is true, though I have not the statistics at hand, that more persons die from suicides and violent deaths than from typhoid fever, because it is a specific disease that can be produced only by its own bacteria. I must say, therefore, that while it is not a fact that it might be well to spread broadcast over the country, I believe there is far less danger in sewage that is popularly supposed, and that sewage may run to a large extent into streams and be disposed of and yet not be a source of danger to the persons who use the water.

Mr. Jay: Does the purifying influence of Croton water extend to Croton Lake?

Dr. Chandler: I think a considerable amount of sewage might be run into the Croton Lake without doing any harm, but I do not think it is run in there. I do not think there is an area of the same size to be found anywhere which is freer from every kind of contamination than the Croton water shed. Of course, during the summer, the newspapers are short of news and, as most persons use the Croton more or less, it is a very popular topic and columns are written against it. Besides, no one can make any money by encouraging the consumption of Croton water, while there is a large interest in the consumption of other beverages, not only alcohol in its various forms, but also mineral and other proprietary waters, even in distilled water, and I have even noticed a beer made with the same distilled water. I look upon these last as a colossal humbug and I never knew anybody to be injured by Croton except some people who have fallen into the reservoir where it was more than six feet deep. In a great many places about the city you will find exhibited two bottles, one of them filled with dirty water labelled Croton, and the other with carbonic acid or distilled or some other water, the object being to induce people to buy the particular proprietary water. In Boston they have the same craze, and there are several springs in New England which are supposed to produce very pure water, and whose owners make a good deal of money out of them. The opinion which I have arrived at from a careful study of the matter is that there is an enormous amount of exaggeration in the reports of the pollution of drinking water. I would not of course encourage anyone in unnecessarily pouring refuse into a running stream, but on the other hand, I should not make myself miserable over the possibilities of such contamination. When I began to discuss the water question at Albany some of the local physicians, who really had very little knowlege of the subject, had much to say about it, and one of them reported that he had taken some gelatine and made a kind of broth of it, and when he put a few drops of the Hudson river into it it began to putrefy, and in two or three days it was perfectly offensive, and that proved that the Hudson river water was dangerous to drink. I was informed that I would be confronted with these experiments, so I wrote back that my friends need not be alarmed, and I made some gelatine preparation, but I did not put any water in it, and it was in a few days just as putrid and offensive without the water as with it, the simple reason being that nature has everywhere provided these bacteria. They are universally present in the atmosphere; you do not take a breath without drawing them in; you cannot take a bottle of distilled water in the laboratory without them; and if you follow them up sufficiently you find you cannot get rid of them, and if you could you would not.

Mr. Cannon: I would ask the doctor whether there is not such a thing as the spontaneous generation of typhoid fever from these deep cesspools. The idea has been advanced that a case of typhoid fever must necessarily arise from a precedent case or a typhoid germ. But in a criticism in the *London Times* on this subject some years, ago the enquiry was made,—How did man first manage to get typhoid fever?

Dr. Chandler: There is no more reason for supposing that typhoid fever can spontaneously originate than there is for supposing a new plant can originate without the seed of a previous plant. The evolution theory carried to its limit would say that the various species of animals and plants have originated in some simple form which had by a process of differentiation elaborated whatever we see to-day. But no such change has ever occurred within the memory or tradition of man, and there is no more reason for supposing that typhoid fever or any other disease produced by a specific germ can originate than for supposing a rose bush can originate in any other way than from a previous rose bush. Many investigations have been made to see if one of these harmless bacteria can under any circumstances degenerate or pass into the form of one of these bacteria that produce specific diseases and there is not such a case on record, It was claimed indeed at one time that three forms of harmful bacteria had been produced by a modification of harmless bacteria, but mature study showed there was no evidence for it, and so from the results of the work done so far, the matter stands to-day. If a cesspool develops typhoid fever, there must have been another case of typhoid fever that sent into that cesspool the necessary germs.

The " Farmers " then adjourned.

# The

# "New York Farmers"

MET again at the Hotel Brunswick on January 20th, Mr. F. R. Rives presiding. The subject of the evening was "Fertilizers." In opening the discussion, Mr. Rives said :

Every New York Farmer, I suppose, has acres—a few, at least—adapted, perhaps most admirably adapted, to the reception of fertilizers. Dr. Goessman, of the Massachusetts Experimental Station at Amherst and also of the Massachusetts Agricultural College, an eminent man of science, has most kindly consented to come and to instruct us on fertilizers. I think I can tell the doctor our wish in regard to a fertilizer and he must judge and decide whether the wish be a rational one or otherwise. We wish a fertilizer, very cheap, adapted to all soils and all crops, of very easy transportation and distribution, permanent in its effects, free from the baleful bacteria of which we heard so much at the last meeting and possessing a smell which shall savor of the Sabæan odors from the spicy shore of "Araby the blest."

Dr. C. A. Goessman then said : The earlier history of agriculture is a record of the earnest struggles of the tillers of the soil to secure a satisfactory compensation for their labor. It is essentially a record of temporary successes and ultimate failures. Taking into consideration the important bearing of a liberal yield of the soil on the general welfare of mankind, it seems but proper to assume that the best contemporary intellectual and mechanical resources have been at all times engaged to secure that end. We owe apparently to past ages as much as we are ourselves entitled to claim, when we calmly consider the previous conditions of society and the character of the special information attainable in regard to the matter in question. Comparing many of our present modes of treating our lands with a view of promoting their productiveness with those in use for a similar purpose in remote ages, we find that they are materially the same. The introduction of irrigation, of under-draining, of fallow and of subsoiling is properly credited to quite remote times and the same circumstance has to be considered in regard to the introduction of the rotation of crops and to the importance attached to a liberal cultivation of deep rooting and foliaceous fodder plants. We know also from history that barnyard manure, wood ashes, salt, gypsum, marl, lime and bones have been used among the ancient Romans for the improvement of the soil and for the increase of the crops under cultivation. Whilst we thus yield these points to preceding ages in regard to our present farm practice, we can assert with not less certainty that during our present century much more progress has been made in recognizing the principles which underlie the above mentioned modes of operation in farm management than during all preceding periods in the history of agriculture. The well-known failures in preceding ages are in a controlling degree due to a want of means of gaining a deeper insight into their peculiar modes of action. The mere statement of the fact that the chemical composition of the air and of water first became known towards the close of the last century, and that proficiency in ascertaining the constituents of the soil and of plants could only be claimed by comparatively few chemists even as late as 1825, will suffice to show the possibilities of these times. The important bearing of these circumstances on the contemporary condition of agriculture is to-day so well recognized that we expect to meet an unqualified endorsement when we assert that the attainment of more satisfactory results in our agricultural industry of to-day aside from improvement in agricultural implements and in the quality of farm live stock is mainly due to a better knowledge concerning the composition and the general characteristics of the air, the water and the soil, and the relation of these agencies to plant life, and to a more correct appreciation of the mutual dependence of an economical production and support of plants and animals in ordinary mixed farm management. The progressive farmer of the present generation has greatly improved his chances of success by calling for assistance in his varied and complicated field of industry on scientific investigators in every department of natural and physical science. The best experimental resources of to-day are serving as his guides. He understands well that although it cannot be denied that horticulture was for ages recognized as a highly developed art, before botany was known as a science, yet the latter has of late rendered most valuable services regarding a more correct understanding of the phenomena of plant life in general, as well as the special relations of important families of farm plants to each other in farm economy; and he is not less prepared to concede that although barnyard manure, wood ashes, salt, gypsum, lime, marl and bones were known as manurial substances to writers on agricultural topics in ancient Rome, yet modern agricultural chemistry has shed a new light upon the question of fertilization by these means, showing their true relations to the chemical and physical conditions of the soil which receives them and to the crops raised upon it and reducing the entire question of an efficient manuring of our farm lands to one principle of restitution. To demonstrate the existence of this circumstance and to teach how to comply with the particular requirements under varying conditions is the work of scientific investigation of a more recent date. It is a well known fact that the composition of the soil, of water, of the air and of plants was but little understood before the latter part of the last century. We have since learned in consequence of a rapid progress in chemistry and some allied sciences how to ascertain the constituents of the soil and of plants and the relation of atmospheric agencies to plant life in general. Experiments in the raising of plants under well defined conditions in the vegetation house and subsequently in the field have taught us most valuable lessons regarding the true relations which exist between the constituents of the air and the soil and those of the plants raised by their assistance. We know also from careful observations in the laboratory of the chemist and in the field that the cultivation of every one of our farm crops, although each in its own way, tends to exhaust the soil sooner or later of available plant food. We recognize therefore to-day as one of the most important results of these investigations the fact that the continuation of a successful cultivation of garden and farm lands necessitates the practice of restoring to the soil under cultivation those of its constituents which the crops raised upon it have abstracted, and in the light of our present experience we feel also quite convinced of the correctness of our conclusion that a rational and thus successful system of farming ought to provide for an economical mode of supplying in an available form the constitnents of the soil which the crops raised upon it abstract. A short statement in regard to the customary modes of improving lands practised in former ages may assist in explaining my position. One of the oldest modes for improving a soil in the interest of raising crops is the system of fallow, which was introduced for the purpose of allowing the land to lie idle for a year, or two or three, and to recuperate by the influenee of atmospheric agencies, of which the principal are carbonic acid, ammonia and nitric acid, allowing these to assist in decomposing the soil and rendering its constituents available for the new crop. This system was carried on for some time until it failed to give satisfactory results. The next step was to introduce manure—that is, to introduce during the fallow year, manure as plant food for the next crop. This could be carried on only on a limited scale because the keeping of live stock on a farm was not properly understood and the manure at their disposal was very limited in quantity. The relation between the amount of live stock kept and the land cultivated was not then fully appreciated because the composition and the nature of barnyard manure were not known. The next step therefore was to raise crops up to near maturing and then plowing them under—green manuring. That has been beneficial on the product of the soil but it is produced at the expense of inherent soil resources. It cannot add to the mineral resources of the soil. It can render food available for another season and therefore be a course of preparation, but ultimately green manuring must hasten the exhaustion of the soil. It is not a remedy; it is only a shift. In connection with these operations, it was found that some crops did better than others. Fodder crops did better than grain crops and in consequence, fodder crops were introduced at an early date. We read in the writings of Roman authors that some plants allied to our clover were highly cultivated as fodder plants and as plants to prepare the soil. These plants produced first a valuable material for feeding and then left a larger amount of refuse in the soil than any of the ordinary crops. The root matters and the stubbles left behind in most of these crops are far heavier than the amount we carry off as our crops and as this was incorporated in the soil by decomposition, it gave a vast amount of manure and plant food for the coming crop. This was carried on successfully for a certain time and at a later period we find clover introduced. Clover is mentioned as a crop that has revolutionized agriculture in its day and is still recognized as one of the most valuable crops we have. But as the composition of the plant and the soil was not understood, nor the relation between the composition of one crop to another, the best results were not attained; and therefore, giving to former ages the full credit of having inaugurated most of our present modes of agricultural practice, we claim that the last and the present century have thrown a far different light on these means for the recuperation of farm lands, and therefore we believe that our present modes are modes that will give not only temporary but lasting relief. The information required was in several directions. First, What does the plant contain? secondly, What does the soil contain? third, What constituents of the soil does the plant absorb? and next, In what relation does the growth of the plant stand to the supply? Some plants require three months to come to perfection; others take nine months, and others two years. The demand of different crops is entirely different in different stages of growth. Information was required in regard to the life of plants, therefore, and next and finally, as to the character of our manures. What have we to add? Of what are these manures composed and do they really meet the demands of our crops? In a few words, though it is a very large field to discuss, I will outline in what way we have arrived at our conclusions in regard to the management of manures. In studying the composition of plants, a study which began before the close of the last century, we learned that most of our plants do not differ so much in regard to the variety of their constituents but in the relative proportions present in them of such constituents. All plants contain lime and potash and nitrogen and sulphuric acid, etc., but in widely different proportions, no two plants really corresponding in that way. Next, we learned that at different stages of growth, different elements are needed in different proportions. This is a requirement of the case which a scanty supply of manure cannot meet, and so we see why liberal manuring must pay better than scanty manuring by furnishing a supply of something to everything and therefore giving the plant a chance to grow. The next question was, Cannot we substitute one element for another? If potash is not present, will not soda do the business of the potash? The answer is, no, it cannot be done. Wherever we try to imprint on nature our own notions, we fail. There is a law that governs the growth of plants;—a certain element is needed and that alone can do its work well. Whenever we attempt to change the proportions of constituents, we change the character of the plant; in fact, we make use of this principle for special purposes, but we know also that in doing so we destroy the propagating character of the plant. We must supply just those elements needed. The next question was, What manures are at our disposal? In this regard, we might consider first the manures made on the farm or barnyard manure, which ought to remain the main reliance of the farmers, for with the rational feeding of farm stock this cannot but be the cheapest manure he can get, and recognizing the importance of that manure, it is of course imposed upon him as a duty to produce as much of it as the circumstances permit. For this reason, we advocate the liberal cultivation of forage crops. In Europe, three-fifths of the entire acreage is in forage crops, this being regarded as the cheapest source of manure and really as capital invested, because that only is capital which is productive. Intensive farming pays for this reason better than extensive farming. In this country, we still cultivate very often too large an area without having the means to do it well, and that is why many of our farms have run out. If our farmers would expend their labor on half the area, they would be far better off. We can readily double our crops with proper management for our present averages are very low—half of what they were 50 years ago in the best parts of this country. This is a great evil which can be remedied only by changing our entire system of treating the soil and producing a sufficient supply of farmyard manure by keeping good healthy live stock. The stock should be selected in such a way that it pays for the expense; the manure ought to be a by-product. When stock only pays for its keep by its manure, they should be sent to the butcher. Therefore, the improvement of our dairy stock has a good deal to do with the improvement of the soil, because we can thus gain higher profits from the stock itself and obtain the principal means for running the farm at little or no expense. But the composition of barnyard manure is not such that it will answer every purpose. It has a world wide reputation as manure and none disputes its merits but it is not always a complete manure. It can only be a complete manure when it contains all the elements the plant requires. If the farmer sells the grain or the roots, one takes away phosphoric acid and the other potash, and the manure he produces at home cannot bring that back, again, unless he takes commercial articles which will replace those exports. We can also make our manure complete by buying fodder and that is better than buying commercial fertilizers, for although I think a good deal of commercial fertilizers and believe that they have revolutionized agriculture, yet they are only supplements to home manures. So barnyard manure may be made to answer all objections except the smell. Now, the smell is not essential; the smell has nothing to do with the sufficiency of it. We prepare from potash compounds of phosphates which might be kept in a parlor without being offensive. The odor of fertilizers is simply an incidental matter, in regard to which the manufacturer has sometimes to meet the prejudices of the farmer, who frequently thinks that if the fertilizer does not smell strong, it has nothing behind it—a peculiar notion which is the reason why we get so many bad smelling commercial manures. In regard to stock feeding, I have mentioned that buying fooder is a yet better way of producing necessary manures and if the fodder is chosen with due regard to the wants of the stock and with the view of supplementing the home produce, it can be produced at a very low price and it leaves behind a more valuable manure matter than we have without it. The economy of feeding one or the other article of food to our stock is not to be settled or decided by the question what its first cost is. The question to be considered is how to find an article which will do its work well and will leave something behind which is worth having. In answering the question whether to feed stock on half bran and half grain meal or on grain meal alone, it was decided the mixture would do as well or better than the other; indeed, it will do better in most cases. But which is the best economy? The bran leaves behind something which is sufficient in nitrogen, phosphoric acid and potash, to be worth $12 a ton while we buy it for $19 the car load. The meal costs at the present time in our section $22 or $23 a ton and it leaves behind what is worth only $6 to $7 a ton. Then comes the conclusion that if I can produce my barnyard manure at such and such prices, then I know I can produce it cheaper than any manufacturer can sell me the commercial fertilizer, because I get first the benefit of the article as food in the support of the animal, producing milk, etc., and giving the force for labor, and at the same time there is left behind a mass of matter which is worth a good deal for feeding another crop. So the system of feeding our stock is as important for producing a good and cheap manure as the raising of the crop by artificial means. These are most important points to be considered, not always sufficiently cared for on farms. On the other hand, if anything has ever shown the good influence of scientific investigation in agricultural operations, it is the endorsement of the introduction of commercial fertilizers for the propogation of farm growth. It has not only given us the refuse materials from different industries and imparted to them a definite value, but it has done this in a channel where such value may be doubled. In regard to the different varieties of commercial manures, we have the phosphates and the superphosphates pure and the superphosphates with nitrogen and superphosphates with potash mixed as compound or so-called complete manures. As to the latter, they have received their name of complete manure merely as a commercial expression, and without recognizing the scientific question involved. They are not the best economy nor are they strictly scientific in their position. They do not apply to any particular case; they are simply mixed at random. Every manufacturer mixes according to his own notions, keeping within certain limits, without regard to what the soil may be to which it is applied. Now, if I have raised on land crops which do not consume phosphoric acid to any extent, why should I buy phosphoric acid and store it up without getting any return? Or if I have put on my land crops which have consumed a great deal of potash, and now depend on a fertilizer which only gives me two or three per cent. of potash and apply only 500 or 600 pounds of it to the acre, what does the potash amount to in an area of that kind? It is as good as nothing at all. We must say therefore that we do not endorse that claim as being "complete" in the real sense of the word. It is the same as with barnyard manure and with ashes—it contains some of the essential wants and therefore it hits cases known and unknown. I can give an illustration in my own experience showing how a soil can be exhausted partially and on one side only, as it were, and where it would be bad economy to buy nitrogen and sulphuric acid. This was an experiment carried on at our station grounds for the purpose of ascertaining the peculiar effects of certain kinds of plant food on one and the same crop. A piece of land, which had been in meadow for years, became exhausted in grass, and was therefore in the proper condition for the experiment, because, unless the soil were exhausted, it would have been folly to experiment on it, since years might go by before the specific effect of the fertilizer could be noticed. We ascertained that it was really exhausted by planting corn on it, and finding that it failed to complete its seed, we saw that it was no longer fitted for corn production. Now, we went to work to test the wants of the soil, because it might be exhausted only in one direction—that is, it might have phosphoric acid or potash or nitrogen in abundance, or it might have lost one or two of the three. The exhaustion might be partial or total. I divided the land into 12 plots, each plot a tenth of an acre in size. With the first three, one received nitrogen in the form of nitrate of soda, the next received nothing, and the third received another form of nitrogen so as to make sure that not the peculiar form of the nitrogen was the cause of failure. The fourth plot received sulphate of ammonia; the next nothing; the next, blood, the best nitrogenous matter in the market; the next, nothing; the next was left without any vegetation; the next was treated with a fair average amount of phosphoric acid; the next with nothing; the next, with muriate of soda; the next, with nothing and the next, sulphate of potash. The same seed was used in all, the same system of cultivation applied, and the seed came out of all those plants quite uniformly at the same time. About three or four weeks passed, and a difference became noticeable. Those plots which had received the nitrogen and the phosphoric acid remained just in the same condition as the plots that had received nothing, and grew up in the same manner. Those which had received potash gave complete crops. Taken by itself, this might seem to the farmers to mean, why, potash is the thing that grows the crop. But potash is useful only when potash is the thing needed. If the rest of the constituents which corn needs had not been present in the soil, the potash could not have produced that crop. That soil had raised in previous years grass and corn in succession, crops which exhausted it in the same direction of potash, and therefore it was quite natural that the potash should be exhausted—corn and grass alike taking in the finished crop four parts of potash to one of phosphoric acid. Grass and corn ought not to succeed each other on the same soil without the addition of potash, and it would be better still never to let them succeed each other directly. Again, land may be exhausted for one crop and not for another, which is also due to a partial exhaustion. I had a piece of grass land which I needed to incorporate in my experiments and on which I wished to apply different fertilizers, and as I could not add any manuring matter because I wished to exhaust the soil, I resorted to a green crop. I chose the horse bean and the lupine, two plants which are rarely used in this country for that purpose, though in England, the horse bean is a prominent crop while the lupine has a reputation since ancient Rome as one of the best plants for green manuring, on a sandy soil. I laid these two seeds down on the same day, drilled them in the same way as the corn, and on this soil, on which no grass would grow, in three months the horse beans were nearly two and one-half to three feet high, as fine a growth as could be produced, and the lupine also did excellently. Therefore, while useless for grass, this soil was good for other purposes.

How can the farmer learn in what condition the soil is unless he ascertains the peculiar action of crops on the soil, and changes his crops according to its requirements? The instances I have given show that the question of manure is not to be brought down to a mixture, which shall act as a panacea. That is an impossibility. As we investigate, we find that even barnyard manure is a special manure, but farmers sell off, one, the hay; another, the roots. Of course the soil is no longer fit to produce those crops, unless the constituents required to reproduce them which have been exported, are replaced by additions from the outside; and here it is that observations in the laboratory and the vegetation house throw needed and additional light on the question of fertilizers. Illustrations might be repeated again and again to show that the question of fertilizers is a most intricate one, but it can be solved on certain lines of operation and we advise our farmers to raise as much fodder material as they can conveniently produce on the soil, to keep as much stock as they can support well with what they raise, then if they want to buy anything to buy fodder articles instead of fertilizers, taking fertilizers only to make their industry independent of their home produce. We recommend a rotation of fertilizers as well as a rotation of crops, and in that way, the farmer has a far greater field to accommodate himself to the requirements of his locality and to produce crops which he can sell and not merely crops which he can with home resources alone produce. That is the benefit we ascribe to commercial fertilizers. The farmer should never place his sole reliance upon them; they are merely an auxiliary in farm production; and as an auxiliary the farmer can afford to pay for them, and only those farmers have failed who have relied on them alone. It is an impossibility to pay for all the labor connected with the commercial product from one end to the other and then expect that the crop shall pay for the outlay. So, while we advocate commercial manures and ascribe to them their due importance and influence in agricultural industry, we at the same time warn farmers to be careful to buy only as much as they absolutely need and with reference only to their real needs, and especially not because their neighbor buys it. Its value depends on what they and their forefathers have taken from the soil and not on what their neighbor is doing to-day. For these reasons, we claim that the diffusion of scientific principles will aid our farmers in their work, and it is wonderful to note the progress our farmers have already made towards an understanding of this question. Fifteen years ago only, we were told "What do you talk to farmers about phosphates and ammonia for?—they don't know anything about them"—yet to-day, I receive hundreds of letters a year from them. Recently, in speaking of this, Marshal P. Wilder said: "Don't you know what has been done by it? You know very well that when we first heard of it, someone might have told that ammonia was a daughter of Queen Victoria and phosphates an Indian tribe, and yet, to-day, we know all about it." You, gentlemen, are real benefactors of agriculture, because you carry on experiments for the sake of experiment and thus teach lessons no farmer can teach otherwise.

Mr. Rives: In regard to the green forage plants which are ploughed under, a gentlemen in New Jersey, Mr. E. B. Withers, famous as a breeder of race horses, has a very good farm and he tells me he has derived singular advantage from sowing the southern cow pea which must be something analogous to the horse bean of England—sowing it about the 15th of June and ploughing it under about the 15th of September.

Dr. Goessman: I have had experience with the southern cow pea. I imported from North Carolina some of the seed and we raised two varieties. I found that it was most profitable; for its crops, to begin with, produce a large amount of forage even in our northern climate. It has not here produced seeds, but they are to be had at so low a price in southern sections that that would be no impediment to its cultivation. I found one important influence that it exerts. We cultivated it in drills and I have never seen a crop which did so much in cleaning out weeds from the soil. It grows so dense that nothing will grow under its branches; it, as you might say, suffocates or kills everything underneath it and does not allow other seeds to come up, and I look upon it in that respect as a renovator of great importance. It answers as a green manure and as fodder and it improves the soil. It belongs to a class of plants, like the clover and the green pea, which have all one common character. They all have a large stem development; some have a large foliage and most have an unusually extensive root system. Some of them will send their roots 16 feet through the ground. The clover will send its roots six or eight feet. A foliaceous plant of this character has a good influence on the farm working, for the reason that it necessitates a good cultivation. Drill cultivation is best for most of our leguminous plants. The application of the cultivator pays, therefore, in the cultivation of the soil, loosening it and preparing it for other purposes. A plant of this kind sends into the ground a root of unusual extent; it does not feed upon one stratum of soil, but it goes down five or six feet and lives on the subsoil; in fact, if the subsoil is exhausted, no forage plant of that kind will grow in it any longer, and that land is in its last stage and needs renovation from the beginning. Such a crop has always therefore been the last resource of agriculture. Because of their extensive roots, such plants live on a larger space of ground and therefore live longer than most others. Wheat has, on the other hand, a compact root and can for that reason live only in a rich soil. Its compact root forces it to live on a small area of ground, and as it must produce its crop during the summer and fall months, it has not much time to develop and therefore must have its plant food ready. But a foliaceous plant goes down five or six feet and does a kind of artificial subsoiling. The plough can never reach the soil on which it feeds and it brings a certain amount of new earth under the action of the air and atmospheric agencies, and therefore it is the best substitute for subsoiling. We can now understand why grain crops grow best after these crops. The land is naturally in the best condition it can be brought into by natural means and by its own resources, and therefore in olden times a grain crop was sown after a fodder crop, and it is good practice. We can use the system better now because we know on what success depends. That is the advance of the present time over former ages when the underlying principles were not understood. We must still rely to a large extent on the natural resources of the soil. It is not the same thing if you buy a naturally good soil or a soil that cannot be made good under any circumstances. There is where the farmer suffers sometimes from lack of knowledge by trying to raise crops on a particular soil which it was never designed to produce and he has to go into the market and buy everything the crop needs to live on. That will not pay in the sharp competition of the present, and he must go down if he does not turn the rules we give him to account.

Mr. Cannon: Very recently, a friend of mine, who has one of the most extensive silos in the country, told me that he had found that the use of manures of ensilage had qualities for surpassing those which had come from the use of hays, assuming that the same quantity of grain had been used as portions in the feeding of animals. I would like to ask if any analysis has been made by the doctor of ensilage manures where grain had been used in connection with it?

Dr. Goessman: I have prepared corn ensilage for the last few years in our dairy with the view of ascertaining its specific effect and what was best to supplement it to make it a complete food. I would not recommend feeding ensilage entirely: I do not think it is the thing to do. One sided feeding will never do for any length of time, for the stock does better to have the fodder supplemented and made up of different articles of food. The construction of the digestive organs of dairy stock requires coarse food at times to keep the machine in running order. We cannot support them by giving them only concentrated food; to have the required bulk is an important consideration. I see corn ensilage gives a manure which contains four parts of potash to one of phosphoric acid. I cannot see why it would not do the same work as the best hay will do, if it is supplemented in the same direction as the hay itself. If ensilage is supplemented in a rational way with bran, it should do as well as any other coarse article of food. I would rather, however, experiment myself before saying that it should have a superior effect as manure.

Mr. Cannon: Does not the corn carry more nitrogenous matter than most plants?

Dr. Goessman: The grain, not the stem and the leaf. In ensilage, most people take the fodder corn. When the ear is fully developed, that would give the whole plant, and that would be a better manure than corn stubble because the one is the ear with the stem, and the other is the stem with leaves alone. There is a difference in the manure coming from well developed corn fodder, either dry or ensilaged, because it takes the grain in with the stem and the grain is far richer in nitrogenous matter and phosphoric acid than an equal weight of the stem, and therefore its commercial value and so indirectly its agricultural value is a higher one. The fodder of full corn plant furnishes, of course, an excellent material for manure.

Mr. Cannon: I may say that it is with a good deal of diffidence that I propose to talk upon rotation of crops or manures in the presence of Dr. Goessman. I can only give my own practice and that has not been guided either by the laboratory or by any scientific experiments. I have followed, or attempted to follow, what has been the English system of rotation and have relied solely upon manures that I have made on the farm. When I break up the sod, I put in a crop of oats for the first year on the green sward. The following year, there is a heavy manuring of barnyard manure and a crop of corn—a very liberal manuring. The succeeding year, being the third year, we seed down with barley, and the fourth year, I am back in meadow. I have never purchased any fertilizers whatever and I may say that on taking the farm, which had been used as a horse farm and a good deal impoverished by over feeding, the best crop I got was about 130 tons of hay on about 275 acres of land tillable or in meadow. In the last two years, on the 275 acres of land, without the purchase of a single ton or pound of fertilizers, I have raised 340 tons of hay, over 400 tons of ensilage and over 2,200 bushels of grain independent of the straw. As Dr. Goessman suggests, all this has been brought about by keeping a very large amount of stock. We are enabled to do that by buying in the fall of the year a large number of steers—in the months of October and November—and wintering them. Those steers are fed strictly on ensilage as a substitute for hay. I am feeding this year 70 pounds of ensilage per capita per day and eight pounds of grain, which is a mixture of bran and corn meal or barley, alternating with barley to give a little variety. We turn those animals off in the spring. Of course I get a very large volume of manure. The intention is to plough the equivalent of the entire farm once in five years. Some portions have never been ploughed, perhaps never will be, being good pasture land, but on a farm of 495 acres, I plough from 90 to 100 acres a year. I am immensely impressed and fortified in my opinions by Dr. Goessman's statement this evening that the real substantial resource of every successful farmer must be the keeping of stock and the making of his own mannres, and I feel that it is a refreshing thing to all of us to hear that this theory that these artificial manures are panaceas for everything is an absurdity, yet we get it here from a very high authority that it is so. In other words, you have to find out the elements of the soil, what is yet present and what has been exhausted, and then find out what is required for a specific crop and that you must restore to the soil, whenever you desire to get good results in seeding down for any crop. I am inclined to think that Dr. Goessman's views are very much in harmony with those we have before heard from Mr. Atkinson—that the only possibility for restoring value to eastern farms is through stock raising—that it is hopeless to think of doing it in any other direction. I was interested in asking the question whether an analysis had been made in regard to the qualities of the manure droppings from the feeding of ensilage, because I supposed that the corn carried more nitrogen than almost any of the other plants, more than grass or clover, and I supposed, being so, the nitrogen would appear in the manure and therefore give it an additional value. In a careful estimate made by myself, it is shown that we can in Vermont, on a basis of $10 a ton for hay and $2 a ton for ensilage, maintain and winter a steer for $6 a winter less on ensilage than on hay.

Mr. Schermerhorn ; I would like to ask the doctor if he knows any way of practically applying muck. I have a very large bed of peat. We have used it at different times for manure, mixing it with other manures. The trouble has generally been that there have been the seeds of weeds in it and in putting it on the soil, it has produced a great many weeds and coarse grass, and other detrimental things. I have used it somewhat beneficially by digging it out and putting it on a rocky surface and letting it lie there over one summer and trying thus to kill the weeds. Then having been dried, I have put it in a large shed where I have kept my colts and the colts have wintered on it and their manure, water included, has been absorbed by it, and it has been mixed then with other manure with somewhat favorable results. It seems to expand the manure and improve it. But if we could make a better use of it, I would like to know it.

Dr. Goessman : The peat or muck is a vegetable refuse produced under the influence of excess of water. Using it directly as a manurial substance I shall recommend adding a liberal supply of air slacked lime—and exposing it for some time to the action of the air. Peat is one of the most valuable absorbents of liquid manure. It adds nitrogen to the manure, but otherwise it cannot increase the plant food, and it should never be used with the idea that it brings anything else than nitrogen in the soil. If potash or phosphoric acid are wanting, it cannot do the work, but this can be remedied by adding some fine ground mineral phosphate from time to time. If bones are too expensive, take some of these West Indian phosphates and scatter a few pounds of it every day throughout the barnyard manure. That practice is good economy for it produces a more complete manure and brings it up to a higher stand-point. On account of its carbonaceous character, peat cannot but do good in the soil; and it is undoubtedly preferable to common earth as an absorbent. With the qualifications I have indicated, I should use as much as could be conveniently or economically turned to account.

Mr. Rives: It would then be a rather expensive manure?

Dr. Goessman: That depends somewhat on the distance from the barnyard to the muck bed. If you have to pay full price for hauling it, it may be too expensive but there is many a day when the team can do nothing else than such work, and if not a dollar saved, it might be fifty cents.

Mr. Borland: I have been very much interested to hear what Professor Goessman has had to say and realize the truth of the main remark that everything depends on restitution to the soil of what has been taken from it. In my own locality, we have been very much in the habit of depending largely on the returns the sea has made to us and many years we have got a good amount of seaweeds, of which I have collected as much as I could get and bedded my pig sties, of which I have a large amount, with it, and letting the pigs work that over, it has helped very much as an addition to the barnyard manure. I have used as a fertilizer and stimulant what I have made on the place, which has been very largely the saving of the droppings of the poultry yard, drying them out very thoroughly and in the spring of the year, about a month from now, and getting various combinations of what I thought would work well to mix with that, such as bone black, blood and things of that sort. We get perhaps six or seven tons of that in a season and use it as a stimulant and fertilizer, when the planting of the crops and corn is going on, and it has answered very well. About New London, the soil is, as we know, very rocky but the ground between the rocks is fertile, and responds very well indeed, so that I have, under this simple system of cultivation, been able to get as high as 107 bushels of shelled corn to the acre, and I have raised wheat at the rate of perhaps 40 or 42 bushels to the acre.

Mr. Bronson: Some 12 years ago, I found it very difficult to buy what my man called home made manure and I thought I would use artificial manures—fertilizers. I had a large field that I was anxious to break up, and I took the soil from four different portions of that 12 acre field, and had them analyzed so as to be sure to supply to the land what it required. I found the analyses were so entirely different in the four cases that I had to buy four different kinds of artificial fertilizers to produce a crop of corn. The result was partially satisfactory—not very—and after trying it for two or three years, I laid the field down to grass with a very poor result, getting a little over a ton to the acre and I was very much disgusted with the experiment, and I thought I would turn, not to home made manure but to city made manure—manure from the carstables in the city, pure horse manure. I got two sloop loads of this manure and landed them at my dock in Southport, and my man, after he had taken it off the sloop and hauled it to the place, told me he hoped I would never order any more because the people laughed so at him about it. I told him we would have the laugh ourselves before long, and so we did, and last year when I ordered another sloop load, the man said he was very sorry but he had already 25 loads ordered for Southport and he could not deliver them. I have come to the conclusion that when we are not very scientific farmers, we must rely on home made manures, and therefore I would like to ask the doctor with what stock we can get the best home made manure. It has been stated that sheep manure is far more valuable than manure we get from cattle or even from hogs. I have found that hog manure when put upon vegetable or root crops is very dangerous, unless it is mixed with horse manure to a very large extent. It seems to be very strong and there appears to be more chance of worms in hog pen manure.

Dr. Goessman: The sheep manure is looked upon as being the most valuable among the home made manures; then comes horse manure, then pig manure and then cows' manure. But by proper feeding and care, we can impart all the qualities to a manure we wish, and we can make the cow manure as good as most. The cow manure is usually a cold manure, for it is more disintegrated than the others; barnyard manure ought to be thoroughly incorporated in the soil before the seeding takes place. A very important question is the keeping of the manure. If the liquid manure is allowed to pass away, that removes a large proportion of most valuable constituent from the manure. The wasting of the liquid manure is a great abuse of the barnyard. Now, in the proccess of digestion, ordinarily three-fifths of the nitrogen and four-fifths of the potash in the food would pass into liquid manure, while the solid manure retains merely the phosphoric acid. Nitrogen costs 17 cents or 18 cents a pound and the best form of phosphoric acid only six cents, so, commercially considered, one pound of nitrogen will compensate for three pounds of phosphoric acid. So, too, the quality of the manure depends on the food more than on the kind of stock it is fed to. You can change largely the constitution of both solid and liquid manure by changing the food. Still, in a general way, on the average the value of different manures ranks as I have stated, provided the entire secretions are preserved in all cases.

Mr. Borland: Is it better to keep the liquid and solid manure together or to separate them?

Mr. Goessman: I should advise to aim at keeping it together. If I was garden farming and wanted special applications and knew what I was doing, by taking liquid manure from the solid, I should find that I could turn that nitrogen and potash to better account than if the solid and liquid manure were not separated. But then I would remember that my barnyard manure was no longer complete and that I could replace the nitrogen and potash taken away. In separating the liquid from the solid, you get special manures, and as the farmer knows little about the changes thus brought about, it is merely accidental if he succeeds. Nine out of ten persons neglect to treat their barnyard manure with proper care and let the wet and rain seriously affect it; and I think the exhaustion of our soil has been the result in a great measure of allowing the barnyard manure to thus become a special manure instead of keeping solid and liquid together.

Mr. Rives: What would be the most desirable and practical method of keeping the liquid and solid manure together?—by the use of absorbents?

Dr. Goessman: Absorbents to a certain extent would be desirable. Peat and turf have been mentioned as absorbent in a high degree. Loamy soil is also good. Sand is entirely useless, as very little can be saved by it. In addition to this, I would apply artificial or chemical means, and would scatter from time to time sulphate of lime over my barnyard manure, or I would take sulphate of magnesia—a most valuable absorbent, which is sold at almost the same price as the plaster, while it is far more efficient than the gypsum. It is soluble in water to a higher degree than the gypsum and therefore a smaller amount will do the business efficiently. We have learned from the experiments of Ville and others, that for instance wheat, our principal grain, cannot be raised without magnesia. When he tried a soil from which the magnesium was removed, it would not produce the grain of the wheat. In wheat grain, there is four times as much magnesia as lime. I should take half sulphate of magnesium and half sulphate of lime and use them as an absorbent. The outlay is small and the result is adequate to the expense. The chemical action is this: when sulphate of lime or sulphate of magnesia come in contact with the ammonia generated in the urinary secretions, they form non-volatile compounds. The ammonia will take the sulphuric acid from the sulphate of lime and sulphate of magnesium and form sulphate of ammonia, which is not volatile and cannot escape.

Mr. Rives: They are also deodorizers?

Dr. Goessman: Certainly. I recommend kainit. It contains a certain proportion of sulphate of magnesium, common salt, sulphate of potash, some chloride of potash and some gypsum. It covers therefore the multitude of cases, and as an absorbent, scattered through the manure, it is a very valuable means for that purpose.

The "Farmers" then adjourned.

# The “New York Farmers”

MET again at the Hotel Brunswick on February 24th, Mr. F. R. Rives presiding. The subject discussed was the “Rotation of Crops.” Mr. Rives, in opening the debate, said:

Many assemblages, as you all know, have convened for the purpose of the rotation and distribution of offices, especially where big boodle has been appurtenant, but so far as I know, this is the only assemblage that has come together for the express purpose of discussing the rotation of crops, and I think that our discussion will have a signal advantage over the other discussions in that it will leave behind no sense of disappointment and no heart burning. We are happy in the presence on this occasion of Dr. L. E. Sturtevant, the director of the New York Experimental Station at Geneva. His methods and observations are already known to many agriculturists and esteemed as of great moment, and I am sure that a great many of you recollect the most interesting manner in which he recounts those observations and methods.

Dr. L. E. Sturtevant then said: If there was any time when I might wish that I were an orator it would be on an occasion like the present, after a good dinner and with an appreciative audience, but unfortunately I am not so gifted. I do not appear before you as a farmer but rather as an experimenter. Experimenting and farming are two entirely different subjects. Farming is the “how to do.” Experimenting is the explaining “why.” So, in treating this question of the rotation of crops, I shall rather give you the reasons why and some literary matter connected with the subject than any absolute directions how to do, and yet very possibly, the reasons why may suggest to you something of the how to do. In rotation of crops, we have a means whereby the present can rob posterity. The question is, Is this a right or is it a wrong in its application? If we look back upon the records of history, we find that the old Roman agriculture can scarcely be excelled. It was our equal in all respects concerning the management of the land. Their operations of culture produced the very best results of which land was capable. We have very accurate records passing from 200 B. C. to 200 A. D., and yet from Cato to Columella and Palladius, although we have these records of the most painstaking and carefully considered farming, and although the maxims followed are those which now find a place in agriculture, we find continual complaints of a retrogressive agriculture and the whole desire was not how to progress but how to equal the crops gained by their predecessors. The second case we will take is England in rather modern times, where we find the first improvement taking place, commencing with the present century, in rotation of crops—the famous Norfolk rotation—and a progressive agriculture, which had, however, about got to its limits when first the use of bones, and in 1841, the importation of guano introduced an entirely different feature into the system. Thenceforth, we have a highly progressive culture, the wheat crop increasing each decade rapidly. Statistics show at the same time increasing crops of wheat, an increasing acreage, an increasing attention to the farm and a decrease in prices. To make the matter plain, the same amount of land which would scarcely support 4,000 population at the beginning of the century was supporting in 1850, 6,000 population. That was brought about by rotation of crops and the use of the artificial fertilizer and we arrive at the following conclusions: that under conditions of the most painstaking husbandry—and Roman agriculture was painstaking to a degree that we cannot hope to excel—the agriculture of Italy was retrogressive, while under equally or less favorable conditions, with the addition of the fertilizer, we find a progressive agriculture. Therefore, we see that rotation of crops by itself may be simply a robbery of the soil, because it increases the amount taken off it and causes a consequent decrease in fertility. But in its relations to modern farming, rotation of crops is supplemented by a supply of material to the land, and so a different set of conditions arise, and the rotation means not robbery, but a getting for ourselves and at the same time leaving the land for posterity in at least as good a condition as we found it.

Unfortunately, there are times when practice is in advance of science. Practice brought out the first certain conclusions we have in regard to rotation of crops. Wheat after potatoes, barley after the turnip—this is what experience found out. Why? That is for science to explain. The famous Norfolk rotation, under which agriculture in England progressed so much was clover, wheat, turnips and barley, and in the improved culture, oats became added, forming a fifth crop. Now, why is it that these crops, following in succession, will give so much larger product, will remove so much more fertility from the land than one crop following another of the same kind? Science can explain this, but experience determines the fact that such was the result. In one recorded case, with wheat following wheat for a period of about 30 years, the average crop was 13$\frac{7}{8}$ bushels, but when it was raised in a rotation with the other crops—turnips, barley and clover—the increase was about 100 per cent. in the crop and this came only when plants of this character were grown with it. If we look at the chemical theory alone of the amount of nutriment removed by each crop, thus leaving the soil so much poorer for its successors, it is not adequate to explain the known facts. But when we go further and consider the individuality of the plants we grow, when we see that each plant has a different rooting system and a different rooting habit, that oats for example feeds on the upper layer of the soil, while wheat, although also in the early stages of its growth feeding on the upper layer, yet gives its crops from the lower layers, when we find clover extending its roots in ordinary hard soil five and six feet and in better soil seven and even nine feet, when we find mixed grasses covering the whole soil to a distance of seven feet down, we are then in a position to suggest that the probability is that where we plant the same plant successively, one year after the other, the same layers of the soil become exhausted. Thus a plant like corn which feeds on the upper three inches of the soil removes the fertility from the upper three inches and when another corn plant is planted the next year on the same place, there is not enough fertility left to carry it to a vigorous crop, and the next year still less yet until the soil becomes for that plant agriculturally barren. But when we follow the corn by another crop which roots deep in the soil, like wheat, we find that the wheat plant feeds upon a layer which is yet fresh, which has not yet been robbed by the preceding plant, and so there is plant food for it there, and we get our crop. Meanwhile, by the slow changes of nature, the decomposition of the soil is taking place, and there is a transfer of food from one layer of the soil to the other and the land becomes equalized, so that by rotation, instead of drawing from one shallow layer of the soil, the whole depth of the soil is brought into our service and therefore we get larger and better crops through the process of rotation. Such is the explanation which has been offered for a great many years, and even at the beginning of the present century, and which recent experiments have determined to be the true explanation, so far as we can say that anything is true in agriculture. Now, if we examine these rotations which practically have been determined to be a success, we find that our theories coincide exactly with the facts. Taking this Norfolk rotation, we have first the clover, a deep rooting plant, bringing supplies from the very lowest layers of the soil to the surface and then by their decomposition invigorating the whole; then, the wheat, which in its early growth takes a little nutriment from the upper layers and which then passing its roots down with very few offshoots until it gets nine or ten inches deep, extends and draws nutriment from the soil at that depth; then, the turnips, which send their roots into an area unoccupied by the two preceding plants, and take up the virgin field at its disposal, and then the barley again takes up an intermediate layer between the surface and that which has been sapped by the wheat and that is again a virgin field. So that by this rotation we are cropping the different areas of land all in the same field, and by that means we get the best results and the largest amount of fertility from the land that the soil is capable of. But the removal of this fertility, no matter whether we remove it from one layer or the whole depth of the soil must ultimately result in exhaustion, as all history has shown, wherever we have had an opportunity of studying the question on a large scale. When, however, rotation is modified by the use of fertilizers, we find that we can retain fertility and we can crop off year after year for an unknown period and yet not come to the end of the soil. To illustrate this on a large scale, we can go to the

Japanese agriculture, an agriculture which has existed from time immemorial. There has been rice crop after rice crop, year in and year out for many centuries and yet the land is as good to-day as it probably ever was, and there has been no instance of any deterioration of it within the historical period. But then, we must remember that the Japanese use not only the garbage which can be collected from their own families, and from the roadsides and fields, but they also use fish manure, being near the coast, and they make use of irrigation, and by these means they have added to the soil as much as they have taken from it. In Italian agriculture, we had all the conditions of agriculture perfect but no supplies from without the farm. True, we find directions given for collecting within the farm a compost heap, as carefully considered as could be given to-day, and also for scraping the dishes, for cutting the hedges and for gathering the droppings on the road. Every way to get manure on the farm was followed and all that was got was applied to the farm, but yet the only result was a deteriorating agriculture. So I might go through other regions of the earth. In England, as I have said, the contrary has been the case in recent times. There, the feeding of rich food to the animals and the bringing in of artificial fertilizers from all over the world have gradually increased and there we have a progressive agriculture where the rotation of crops has come in as a most wonderfully successful means to the end aimed at, because the whole end of agriculture is to get the fertility out of the land in the form of crops.

These, I think, are the facts relating to rotation, and the reasons that I have given you are some of those why rotation is so efficacious; and it is easily seen that, like every powerful remedy, it may be used for the good of the land or abused to its injury.

A Member: Will not deep ploughing in some degree answer the same purpose as crop-rotation?

Dr. Sturtevant: In deep ploughing we go to a depth of not over nine inches; and in speaking of shallow ploughing we mean four inches. How long will the extra five inches delay the ordinary process of exhaustion? It may be efficacious for one or two rounds of the rotation, but then it becomes useless. The capillary connection between the upper and lower layers of the soil, whereby water is continually being brought from below to the surface, is perhaps a most important point in agriculture, and yet we know very little about it. We do know that the elements of fertility are thus constantly being replaced on the surface, and that the surface soil is always richer than the soil below. If plant food leaked down, the opposite would be true. We also know that in dry climates, or in dry seasons preceded by a wet season, when there are many soluble salts in the land, these are deposited on the surface by capillary attraction, and then we have the alkali lands of the West, which gradually become useless for agriculture in this way. In India there has occurred an interesting instance of the value of capillarity. At the time when the English conquered the country, there were many canals, which had been built below the levels of the irrigated fields, and the ryots pumped up the water by hand and poured it on their fields. Under those circumstances, the ryot would not pump any more water than was necessary—he put on just enough, and no more. But the English government resolved to do a great thing for its people, and they, at a great expense, raised these canals above the level of the fields, so that the water could be supplied by opening a tap and letting it run on. Then the ryot would put on more water than he needed, and this water, passing down into the soil, carried with it the soluble elements to below, and then came to the surface again and was evaporated. Thus the soil was changed into an alkali soil, and thousands of square miles became useless for agriculture. It is plain, therefore, that deep ploughing may be advantageous under certain circumstances, and under others disadvantageous. Where the soil is hard and impermeable, deep ploughing is, once in a while, a benefit. But farming is, to a great extent, a matter of judgment.

A Member: Speaking of ploughing in clover, would you plough it in before it was in bloom or after?

Dr. Sturtevant: There is one very peculiar thing about clover, which illustrates my former statement that practice is often in advance of science. For a long time science said that in the matter of clover, practice was wrong and that it was against common sense as well as against scientific teaching that a second crop of clover could be better for ploughing under than the first crop. Practice had however established it to be the fact that you had better take off the first crop of clover for hay and then take the second crop for ploughing under. Of late years, we have discovered why it is that science was wrong and practice right. The reason is that the largest bulk of clover, and that part of it which is of the greatest value for manure is in the rooting system. When you take the first crop for hay and then let the clover continue to grow into seed, you have increased the roots to as great an extent as you have removed material away, and you have left in the field a large amount of organic matter for plant food. This is decomposed, but even then the nitrogen does not immediately become plant food, until these minute organisms—so minute that it requires a microscope which magnifies 300 diameters for us to see one of them—take hold of this organic matter and change it into nitrites and nitrates and those chemical salts are plant food of the highest value. So long as you can raise clover, you can have wheat and clover for an unknown period, as Mr. Sheldon can tell you is the case in Geneva and in that locality. But a time comes in the older nations, and it has come in this country in some sections when the clover has pumped up all the nitrogen in the layers below and brought it to the surface and the crops have removed it and then the clover won't grow any more and there is an end of the rotation and your land is, as the phrase goes, "clover sick."

Dr. William Everett, of Quincy, Mass., then said: Mr. President and gentlemen of the agricultural persuasion, I have occasionally been called upon to address agricultural societies in my own State, because, as you know, the soil of Massachusetts is much the most fertile and varied that there is in the country, being like the bottom lands in Kentucky, where they grow the hemp—it has to be exhausted before they can grow ordinary crops. When the farmers meet, we first get some laymen to exhaust them with speeches, and then they can go home and raise their crops comfortably. I have been engaged for the last few years in trying, as a schoolmaster, to make something out of the boys from different parts of the country. You know what the position of a boarding-school master is. It is his destiny to receive all those boys with whom the local schools cannot do anything at all. Of course, we have a most admirable school system in America in our public schools for the purpose of educating good boys; but when there is anybody that neither parents nor local schools can do anything with—ground that has never been broken, or ground that has been exhausted by over-cropping, or ground that has never had any proper fertilizing, or ground that has been overflowed by too much irrigation and raising the levels of the canal, or ground where a crop of wild oats has begun to spring up, as Virgil says, in the very furrows where we planted the fine large grains of barley—in that case it is considered well to send the boy to a distant school and see what can be done with him there. Then, as soon as a school gets a reputation for dealing with one or two bad boys, it receives ten or a dozen, and then thirty or forty, and so on, until it becomes a reform school in no time. In old times we did have educationally something like rotation of crops. It was supposed that there were various studies and various methods of discipline which it was desirable that everybody should take hold of. I am not speaking of elementary education, but of something like a liberal education. It was supposed that every boy should know something of his own language, and of modern and ancient languages, of mathematics, of history, and as science came forward, that he should know something of that. Now, the idea has been brought forward that there are these things called specialties, and that you should find out at a very early stage in the education of your son, nephew or grandson, the some one thing that they have got to know, and that thenceforth they are to be put to learning that and nothing else—something that the boy has shown some fancy for. If he has cut his fingers with tools a good many times, it is at once settled that he is to be a great mechanical genius; if he has succeeded in rigging out something with wires and communicating a message to the girl in the next house, it is decided he is going to invent a new telegraph; and if he manages to pick up some very improper words from the Irish laborer, he is destined to be a great philologist. In that way we are taught that this old system of a varied rotation of studies is to be done away with, and that we are to find out what is the bent of the boy's mind, and what is the one thing that will be useful to him in his after life—and then that is to be the only thing that he is to be taught. That idea has been pressed so far that at Harvard, in their new system, there are 50,000 different ways of entering the college. This is a literal mathematical fact. But the old idea is, that if the attention of the mind is given to one line of study exclusively, it very soon gets over-cropped, it gets "clover sick," it gets exhausted, it gets in the state of those fields along the Eastern shore that Mr. Rives knows so well, where tobacco on tobacco on tobacco has been raised and nothing has gone back to the soil—and many of these young men devoted to one subject have raised no crop but tobacco, and then raised it over and over again until the soil has got exhausted. At the old-fashioned schools, we believe that while there are certain obvious and plain crops to be raised, like arithmetic, and geography, and modern history, and the easier branches of science—corresponding to corn and the other things that farmers raise for men to eat—but there are, also, other studies that strike their roots deeper down into the soil of the boy's mind, and that you do not raise to make the daily bread of life out of, but in order to plough them under, so as to take hold of the deeper strata of the ground. You raise these crops of advanced branches of science, which do not come into bookkeeping, and of these old languages and history, which it is said by some are dead, but which are really alive, because they have the power to strike their roots into the deeper layers of the mind, and because they contain in themselves those microscopic organisms which the ordinary mind cannot see, but which take hold of the things which are not plant food, and in the depth of the boy's mind convert them into plant food, out of which will arise that which will be more useful than all the top strata crops that you gather in the common schools.

What do we cultivate our fields for? We do it to raise that which will support man and beast, and man through the beast. What do we educate our boys for? Not to make them this or that particular thing—not to turn out so many manufacturers or lawyers or doctors or ministers—but to make character, to make them American men. We are trying to strike the roots of education down deep into that virgin subsoil, which the air and the rain of the momentary impulse does not affect. There are these old-world branches, these hard sciences, which they have got to work out by themselves, and which cannot be all explained and put into text-books. Those are the things from which you can raise imperishable and ever-returning crops, not only for this year but for posterity.

I would apply the idea of rotation of crops even after you have got outside of your boys' school. With reference to ourselves, it is our duty as Americans to see that we in our own lines have a sufficient rotation in what we do. Each of us has his own occupation, and devotes himself to that; and each is prone to say, when he is called upon to attend to some other thing, "oh, my business fully occupies me, I have no time for that." It is a noble thing, therefore, that you men here, each with his own line of effort, have taken to agriculture as you have. The very fact that you are not born farmers, the very fact that to speak of you as sons of the soil sounds like a joke, makes it all the better that you have made up your minds that you will have some other pursuit than your ordinary avocation. You want to have more still. Many of you are interested in politics. You want to be still more so, and you want to have it felt that the men of leisure, the men with their brilliant places in the country and their extensive concerns in New York are interested in the life of the nation. You want to be interested in literature, too, and to have as many interests as you can. America cannot afford to have her men all specialists. We are not large enough nor old enough for each American to devote himself to one thing only. When our fathers came to this country, they had to make the whole country at once. They threw themselves into all the relations of life. They were farmers and manufacturers and politicians and literary men—every one of them—with all their heart and soul, and their farming reacted upon their manufactures and the church re-acted upon their politics, and if America does contain within herself all the advantages—the memories of the old world and all the hopes of the new age—it is because every true American is a microcosm in himself and contains within himself all the elements of a farmer and a minister and a politician and literary man and man of business. If any American finds himself devoted exclusively to any one thing, let him stop that crop, for his mind is in danger of being overcropped, and let him plant something else which shall strike its roots down into a still lower stratum and into soil that is comparatively virgin.

I am glad to hear Dr. Sturtevant praise the ancients as being so good in their agriculture for as I know more about Virgil's agriculture than that of any of the modern writers, it was a great comfort to know that I had not been wasting my time. When some gentlemen nowadays abuse the classics and say that there is no good in anything that was written in Latin and Greek 1800 or 2000 years ago, I feel like saying, "well, let it be as you say, call these old writers all the offensive names you can, but what after all are the ancient classics and even the old science and history. Why, they are guano, they are the precious deposit that has been preserved to us for ages, that contains in itself the rich ammonia and the phosphates that are needed to fertilize our modern brains. If they smell bad to you, shut your noses, but spread them out over your boys' minds and over your own, too, if you have the time, and I assure you that however inferior these ancient classics seem to you, they have got the old vitality in them and their phosphates will fertilize your minds and you will find such crops come out of them as you could never get out of the crude trash of modern literature that was only half digested before it was deposited."

There is another thing. Virgil tells us that in the fields, in the time of blight, we are surprised to find spring up, instead of the soft violet or the purple daffodil, the thistle and the thorn. That is perfectly true and shows the acute observation of the moralist as well as of the agriculturist. But what is the thorn that comes up to mar the labor of the careless husbandman who has been thinking of nothing but a pretty crop of flowers? It is the Christ-thorn; it is the thorn that is the symbol of the tribulation through which we can alone come to immortal life. Those thorns and thistles which obstruct you when your life or the life of your sons has been careless and you have been aiming at nothing but soft violets or narcissi, are to remind you of all the suffering and sorrow that we must bear; and so the very field as it presented itself to the ancient poet and moralist works out the principle which is to direct us in our life.

Mr. Dinsmore and Mr. LeGrand B. Cannon made some brief humorous remarks and the "Farmers" then adjourned.

## The

# "New York Farmers"

MET again at the Hotel Brunswick on March 10th, 1887. Mr. John Jay presided and in introducing the topic of the evening—"Injurious Insects"—he said:

In the absence of our president, who is now in Florida, and who is acustomed to fill this place with an ability and grace which recall to those who had the good fortune to know him, his distinguished father, the great statesman and diplomatist of Virginia, it becomes my pleasant duty to introduce to you the gentlemen from abroad who have kindly accepted your invitation and are here to say a few words on the subject of "Injurious Insects." It is a subject of general, I may say universal, interest to all of us. It affects our fields and our fruits and our flowers and our trees; incidentally it affects our comfort and our enjoyment of our esthetic tastes, and perhaps sometimes the serenity of our tempers, particularly as we see our beautiful roses suffering from the beetle that threatens them with destruction. Professor Riley, who is at the head of the Entomological Commission of the Department of Agriculture will address us on this subject, and we are particularly indebted to him for his presence to-night, because this is the first journey he has made in some time in consequence of his delicate health.

Professor Riley then said: I am afraid that I shall find some difficulty in entertaining you to-night on this subject of "Injurious Insects," for of all subjects, it seems to me, it is the most prosaic and the least calculated to excite mirth or sentiment or to form the topic of an after dinner talk. It is always the unexpected that happens and a few days ago I little thought of being here addressing a lot of city farmers on such a subject. I was then unfamiliar with the *personnel* of the club and I am both pleased and surprised to find that there are a few persons present here to-night whom I have known before. There is my friend, Professor Lintner, who has done so much good entomological work and who is serving you so faithfully and efficiently as your State Entomologist. There is Dr. Loring whom I had the pleasure to serve under during the four years of his administration of the National Department of Agriculture which he advanced by breadth of culture and public spirit and which he graced by his presence as he does such festive boards as this before us. There is Mr. Depew whom I had the honor to journey with on a Cunarder in 1884 and who, I am glad to see, does not find politics, railroads and farming antagonistic, at least in post prandian hours, and who will, let us hope, be induced to bring in Momus to offset the sad and dreary current of what I may say.

The subject of "Injurious Insects" is a vast one, and cannot be properly dealt with in the limited space that will be at my command. I have been somewhat puzzled even to know just what to say—just what insects to talk about among the multitude that are injurious to our crops. Informed by Mr. Pellew, through whom your President urged me to be present, that I should be at liberty to choose my own subject I came prepared to talk a little upon the relation of insects and flowers, thinking that that subject might interest you as much as any other, since you all have something to do with flowers and there is a very interesting and fascinating connection between them and insects. But upon consulting a little with Mr. Jay and hearing the opinions of one or two others, I have learned that perhaps you expect, and will be more interested in, some remarks upon the insects that injuriously affect the trees that are ordinarily used as city shade trees, especially as I understand that Prof. Lintner will follow on the insects injurious to fruit trees. For that reason I will take a few of these for a text, and may premise that there is not a single insect that would not occupy more than half-an-hour to be properly treated of in all its habits and phases. I shall, therefore, confine myself to those more particularly that defoliate the trees, leaving out of view the borers and those that affect the root and the branch and the blossom. By way of introduction, and assuming that most of you are neophytes in economic entomology, let me state a few general truths. As I have elsewhere written, insects play a most important part in the economy of nature. The average townsman, accustomed only to troublesome household pests, can scarcely appreciate their numbers, their diversity in form and habit, or their importance. As scavengers and pollenizers of our plants and fruits, they not only vitally concern man, but, philosophically considered, are essential to his very existence. They supply us with the sweetest of sweets, our very best inks and dyes, our finest robes, lace and waxes, to say nothing of their use as food (and few who have not studied the subject have any just idea of the importance of insects and their products as articles of food!) But the benefits which man derives from insects must always appear trifling compared with the injury they inflict on our agriculture. In the primitive condition of vegetation, as the hand of man first found it, insects took their proper place in the economy of nature and rarely preponderated in any direction to the injury of the wild plants, scattered, for the most part, sparsely throughout their range. Harmony between organisms, in the sense of the widest inter-relation and inter-dependence, had resulted in the long course of ages. But civilized man violated this primitive harmony. His agriculture, which is essentially the encouragement and cultivation in large tracts of one species of plant to the exclusion of others, which he denominates weeds, gave exceptional facilities to the multiplication of insects, which naturally feed on such plants. In addition to this, many others have been unwittingly imported from other countries, chiefly through commerce; for it is a most significant fact, that the worst weeds and the worst insect pests of American agriculture are importations from Europe. Thus, in addition to the undue increase of our native species, we have to contend with these introduced foreigners, for, as compared with Europe, America, as your own Dr. Asa Fitch long since remarked, is the land of insects. Insects probably outnumber in species all other animals combined, some 350,000 having already been described, and fully as many more remaining yet to be—I won't say discovered, but—characterized. And the proper and conscientious characterization of some species of microscopic insect involves as much labor as of one of the higher animals. Of the above number a good proportion are injurious to vegetation. Our associate on my left, Mr. Lintner, has estimated that there are 156 species that attack the apple alone, in one part of the tree or the other, either the fruit, blossom, trunk, branch or the root.

Let me now keep more strictly to my text. The insect defoliators of our shade trees consist chiefly of four species. They are: 1st. The imported Elm leaf-beetle (*Galeruca xanthemelæna*). 2d. The so-called Bag Worm with the very long name of (*Thyridopteryx ephemeræformis*), sometimes called also the Drop Worm; 3d. The White-marked Tussock-moth (*Orgyia leucostigma*), and 4th, the Tall Web-worm (*Hyphantria cunea*). I will briefly give you the principal facts connected with these four insects, though it is very difficult to do so intelligently without diagrams. No. 1, the imported Elm leaf-beetle is a little yellowish beetle, with two stripes on the elytra, and which you all probably know from appearance. It is not more than one-fifth to one-eighth of an inch in length. It winters over as a beetle, hibernating in all sorts of sheltered places, in the holes of trees, in our posts and fences, under the loose bark of trees, in outhouses, in barns, in bedrooms even—any sheltered situation that it can find, and also under the leaves of our forest trees to a very limited extent. As soon as spring opens, it leaves its winter retreat, takes to wing, for both sexes are winged, and speeds to the trees on which it feeds and on which it lays its eggs. These trees are exclusively the elms and it is very partial to the European elm. The female lays her eggs upon either the upper or under side of the leaf, but chiefly on the under side, in a double row of from 15 to 20 eggs each, each egg being yellowish elongate and pointed at free end. From these eggs there hatch the larva or worms which feed upon the trees, eating at first the mere epidermis, leaving the parenchyma, and causing the leaves to look rusty and sere,—and finally, as they grow older, eating holes through the leaves. We all know the appearance of elms that are infested or injured by these pests. The beetle, as well as the larva, feeds on the leaf, but it is the larva that chiefly does the damage. This insect is multiple-brooded, i. e., produces several generations during the year, so that its work can be seen throughout most of the summer months, and from the middle of May to the end of the growing season is noticeable. The larva descends from the tree chiefly by crawling down the trunk, but sometimes lets itself drop, and transforms at the surface of the ground or just underneath the ground to a pale yellowish pupa, naked, without cocoon, and in a couple of weeks becomes a beetle. These beetles lay eggs for another generation and so on. This species is an importation from abroad and did not originally occur in this country. Insect No. 2, the Bag Worm has a very interesting life-history, and an hour might profitably be given to it alone. During the winter season, there may be noticed hanging from the bare branches of our trees the weather-beaten cases or bags of this insect. If you cut them open, you will find the great proportion of them empty, but some will contain eggs—a brown shell filled with eggs and the eggs interspersed with a fine soft silken down. These eggs hatch, as soon as the leaves put forth, into young active worms or caterpillars. The first thing the young worm does upon hatching is to begin to make a house for itself, and it is a most amusing thing to watch it at this work. First of all, it spins a belt of silk, and after having formed the belt it gets over on the further side of the belt, puts its head under the belt and makes a perfect somersault, bends up and loosens the belt and then spins a second belt, extends the ends and finally joins them so as to form a circle. It then forces this ring of silk round the neck and by spinning more and more silk to the base at last pushes the little ring of silk up until it has formed a perfect cone. As soon as that is formed, it begins feeding. The cone is carried upright for some time, but as the worm increases in size, the bag or cone becomes too heavy and is allowed to drop. Not to be too particular as to details, this worm in time acquires full growth, seals up its bag and fastens it securely to the tree or branch, so as not to be carried down to the ground by the fall of the leaf, Here the worm transforms to the pupa state. The male pupa is small, shows evidence of future wings, and in due course of time, an active four winged moth, black-bodied and glossy-winged, issues from the end of the silken bag. The female pupa shows no trace of wings and in fact the perfect female is a wingless and legless creature of very degraded character biologically speaking. She partially issues from the end of the pupa case, but remains in the bag, and the male by a telescopic provision of the genital organ is enabled to reach her within it. Fertilization takes place, and the eggs are laid in the case or puparium where they remain during the winter protected and secure. This insect is single brooded. The female is, as I have said, perfectly wingless and can never travel away from the tree on which she was born, or on which her bag or cone is first fastened.

We next come to No. 3—the White-marked Tussock-moth. This is, I believe, in this city and in most of the cities of this State, one of the worst of your shade tree insects. It is the species which produces that beautiful hairy caterpillar which you have all doubtless noticed in Central Park and which in years gone by was extremely injurious there—a beautiful creature—entomologically considered, of course—with bright, yellow brushes upon the back with longer tufts of black, and with a coral-red head and coral-red tubercles on the back. This caterpillar is hatched from eggs which have passed the winter not inside but on the outside of the cocoon, fastened to the trees—and as a rule to the trunks of the trees. The male of this species is also fully winged, the wing being brown, with a large white spot from which it gets its specific name. The female is, on the contrary, wingless, and she issues only from her cocoon to crawl on the outside of it and there lay her eggs. She covers those eggs with a substance that hardens and protects them. There are two generations every year and the second generation winters in the egg state on the outside of the cocoons, which you can see to-day plastered on the larger trees in Central Park or in the city.

The fourth insect I mentioned is the one that you seem to be most concerned about—the Fall Web Worm. Last year, there was a phenomenal increase or advent of it. It is the worm that webs the leaves and the twigs and the branches of the tree and absolutely defoliates it, causing it to present a very unsightly appearance and doing a great deal of harm. This insect hibernates, not in the egg state or in the perfect state as the three others that I have mentioned do, but in the pupa state. At the present time, it can be found in all sorts of sheltered situations within its cocoon as a chrysalis. As soon as the leaves are about full formed or in the month of May, there issue from these chrysalides certain white millers or moths. Both sexes are winged and therefore both readily fly. The female lays her eggs upon the under side of the leaf in a serrate mass. They are pale yellowish, very prettily sculptured and in a very few days hatch into young caterpillars, which are social and gregarious from the start and live within a web, gradually increasing the web as they increase in size until they encompass the whole branch and sometimes a very large portion of a tree that is small. There are two broods of this insect, the last brood hatching in early August in the Southern States and hibernating as a chrysalis, but in the north there is some reason to believe there is only one.

Thus we have four insects concerned in defoliating our shade and park trees and they have very different habits and very different characteristics. Let me summarize. We have one, a beetle, perfectly capable in both sexes of flying, producing several generations during the year, wintering as a beetle and therefore very difficult to manage in the winter season. In fact, we can practically do nothing with it during the winter, because first, the beetles are hidden in out-of-the-way places where we cannot reach them, and, secondly, if we could destroy them within the city limits, we could not prevent them from flying in from the suburbs in the summer season. But with the bag worm, everything can be done in the winter season. There we have an insect that hibernates in the egg state in pods which are easily discerned on the branches of the bare trees. There is, therefore, no excuse for the increase of this pest, for it is a pest in the cities further south, though you are comparatively free from it in New York. In Richmond and Washington it is especially troublesome. It can be destroyed by burning or, preferably, by collecting the bags and depositing them in an open space. There are a number of parasites that affect this species and I have always urged that on pruning the twigs containing these bags, instead of being burned, they should be gathered together and left in a mass in some pasture away from trees so that the parasites which are also found in these cocoons may mature. If the bags are allowed to lay on the ground until midsummer, these parasites will issue as winged creatures and fly away to destroy other bag worms, while the young worms that hatch from the eggs, with very restricted and limited powers of locomotion must inevitably perish before they can reach any tree on which they can feed.

With the Tussock moth, much can also be done in the winter season because its cocoon and the eggs upon it are found upon the trunks of the trees and undoubtedly the brushing of the trees or the crushing of the egg masses, so far as they can be reached, may be effected very largely. I might state in addition that this insect is particularly numerous in the older States where the trees are larger. It seems to have a preference for the larger trees. It is not numerous in Washington City at present, at least on the younger trees. It is particularly abundant in Boston and in Philadelphia it is the chief insect found on trees. It is very abundant in Albany also, as Dr. Lintner knows, and has been so in Central Park. It is rather difficult to reach because it not only spins its cocoon upon the lower portions of the trunk, but all over the trunk and limbs.

The fourth species I have described, the Web-worm was, as I have said, the most destructive of all last year. Throughout the New England States and on all the Atlantic coast, it had a phenomenal increase and in Washington City, it became the "caterpillar nuisance." This can also be dealt with in some degree in the winter season. It hibernates in all sorts of sheltered places, such as the eaves of houses or in the angles of tree boxes. It can measurably be reduced by searching for and destroying the cocoons and chrysalides during the winter.

There is fortunately one remedy that applies to all four of these insects alike, and whether or not we attempt to prevent their ravages by destroying them in the winter time, we may, after they have got to work, successfully and thoroughly and economically and cheaply protect our trees by the use of the different arsenites. Every one of these four insects feeds by devouring the leaves in the larva state, and in the case of No. 1 in the beetle state as well, and they are all amenable to the same treatment—in other words the spraying of the trees with a solution of arsenic in any form will very effectually destroy all four species as soon as they hatch. Allow me to read here a few lines from Bulletin No. 10 of the Entomological Division of the Department of Agriculture, now being printed on this subject of spraying.

"From the natural history facts already given it is clear that they all begin their work very much at the same season or as soon as the leaves are fairly developed, and arsenical mixtures properly sprayed on the trees about the middle of May and repeated once or twice at intervals of a fortnight later in the season, will prove an effectual protection to trees of all kinds. This can be done at small expense, and will prove the salvation of the trees. An apparatus can be readily constructed, such as has been used on the grounds of the Department of Agriculture, on a sufficiently large scale to economize time and labor. It should consist of a water tank mounted on a cart and furnished with a strong force pump operated by one man and furnished with two sets of rubber tubing of a sufficient length (a hose reel can be constructed on top of the cart), each hose supported by a bamboo extension pole with a cyclone nozzle at tip. With such an apparatus as this three men could drive along the streets and thoroughly spray two trees simultaneously; while if it were found advisable, four independent tubes and four men to work them could be employed with a sufficiently powerful pump, and thus expedite the work. The details of the more important devices connected with this tank-cart are given in my official reports. The bamboo 'extension pole' is used simply to stiffen the rubber hose and to enable the operator to elevate the spraying nozzle into the center of the tree and spray to a so much greater height. The same result can be accomplished by means of a brass rod or gas pipe, in sections, and this has the advantage of superior strength, and will consequently carry a heavier nozzle or a bunch of nozzles at the end.

"The 'cyclone' or 'eddy-chamber' nozzle is better suited for work of this kind on small trees than any yet in use. It is small, simple, cheap, will not clog, and gives an admirable spray. A combination nozzle may be made of several of these which will be readily supported by the section rod and will throw a more profuse spray.

"The arsenical compound known as London purple is, as already shown, perhaps preferable to white arsenic or Paris green in that it is not so liable to burn the leaves while its color enables one to readily distinguish poisoned from non-poisoned trees. Moreover it is very cheap. From one-quarter to three-quarters of a pound of this substance should be used to a barrel of water, and with this quantity of water it is best to mix three quarts of cheap or damaged flour which will serve both to render the mixture adhesive to the leaves and also to lessen the tendency of the poison to burn the leaves. Three-quarters of a pound to the barrel may prove too strong a mixture for delicate and susceptible young trees, and it will be best for general application to make the amount from three-eighths to one-half pound to the barrel. Paris green will require a somewhat heavier dose—say from one-half to one pound per barrel of water."

I am now referring of course to city shade trees and my remarks apply to streets where there are long rows of trees to protect. If you only have a few trees, you need not go to the expense of a cart or tank but a mere barrel that will hold a sufficient amount of water can be used, so long as you have a force pump and the spraying attachment. This last is novel and I should like to show you how it works, but that is not practicable here. It consists of a little disc into which the water is forced tangentially by means of a force pump so as to be made to revolve at an intense rate in a cyclonic course and it issues through a central orifice on the upper portion of the disc, and is detachable, so as to permit the cleaning of any impediment or the removal of any obstruction that may get into it. Through the minute orifice a spray is formed so fine that it can be scattered on the under side of the trees without dropping and so as to prevent washing away by rains. Any respectable firm dealing in colors sell the London purple, and a pound costing not more than five cents, can be placed in 80 or 100 gallons of water and can be sprayed on the trees.

Mr. Otis: Is it absolutely necessary to use the purple or the Paris green?

Prof. Riley: Some form of arsenic.

Mr. Otis: I have been told that simply washing the trees well with water by means of a garden engine will wash the beetles off.

Prof. Riley: It is useless to wash the beetles off because other beetles will fly in. You want to kill the beetle and kill its young. One pound of arsenic and one pound of sal. soda boiled in one gallon of water till the arsenic is dissolved and diluted at the rate of one quart to 40 gallons of water will answer as well as London purple and Paris green. The chief merits of arsenic are cheapness and solubility. Its demerits are its color which makes it liable to be mistaken for harmless compounds. Paris green has been more extensively used than any other arsenical compound and is on the whole one of the most useful. The only advantage the London purple has for tree purposes is that it is of a different color to the leaf and therefore you can better judge when a tree is properly sprayed; secondly, it is cheap; thirdly, it is more soluble; and fourthly, as far as absolute experiment goes, it is really more efficient. On the Department grounds we had an excellent opportunity of testing, for we have there almost every species of elms cultivated, from the imported or European to the several indigenous varieties. The beetle shows some preferences and on one occasion I remember distinctly I took half of the trees of each species and treated them and left the other half untouched, as an evidence to Mr. Sanders, the superintendent of the grounds, of the effect of our treatment and the trees treated were green for the first time in many years in the middle of the summer, while those not treated were destroyed. While this beetle has its preferences, yet when numerous, there is no elm absolutely free from its attacks.

Mr. Pellew: Is there any tree free from the ravages of all these four insects named?

Prof. Riley: Oh yes. For instance, to be specific, I will say that the Elm-leaf beetle is confined to the elms and attacks no other genus of plants. The Bag worm is a very general feeder, but at the same time, it is more injurious to conifers or evergreens than to deciduous trees. The Tussock moth has a decided preference for the larger and older elms and the maples—the soft maple it is attracted to particularly, I think—and never occurs on conifers. It is fond also of the horse chestnut and several other trees that might be named. The web worm is also a very general feeder but has a great predilection for the box elder (*Acer Silgundo*) and I would never advise the planting of that tree in any city liable to its attacks. But it is not partial to the other maples. The soft, the sugar, the Norway and the silver maples are rarely affected by it. It is fond of the poplars and the willows. There are some trees that are never touched by any of these insects, but these are trees which the municipal authorities seldom think of planting. We are all creatures of habit and most of our gardners are Scotchmen or Englishmen, who come here with the notions they imbibed at home, and they have introduced the foreign trees and have often neglected indigenous ones. Our sweet gum and tulip tree are never attacked by insects, and there are no more beautiful trees in the world, whether for autum foliage or for general beauty of growth. There is also the sour gum and quite a number of other trees that are perfectly free from any of these four insects and that ought to be tried in preference to the trees often planted.

Mr. Dinsmore: I had some maples that had millions of pure white flies beneath the leaves.

Prof. Riley: They are probably perfectly harmless things—May flies. That is a phenomenon totally outside of the question we are considering. They will never do you any mischief. May flies feed in the larva state in water and simply come there to settle just as they do on the windows of houses.

Mr. Pellew: Do either or any of these four insects attack the ends of the boughs and bore into them so that the boughs break off?

Prof. Riley: No, sir; that is an entirely difficult thing. My friend, Dr. Lintner, will I hope touch on some of the fruit insects. I want to say a few words further about white-washing trees. I do not know whether that is the custom in New York City, but in Washington, the authorities, though they have never given any attention to the subject, have the idea that white-washing frees the trees from some of these insects. In reality, there is only one of the four insects that can be in any way thus affected and that is the Tussock moth. So far as the white-washing reaches, a certain number of the cocoons wlll be loosened and exposed to the rains or rubbed off by the brushing, and it may possibly be that the lime will affect them though there is no evidence that such is the case. But it is of no earthly use against the Bag worm or the Elm leaf-beetle or the Web worm, and if it must be done at all, there is no reason why the authorities should not at least color the lime so as to cause it to resemble a little more nearly the color of the trunk of the tree. Of course, I will not discuss the matter from an æsthetic standpoint, yet while to some it may not be unpleasant to see a lot of trees white-washed, I for one do not like to see it. I may even add that so far as the insects I have mentioned are concerned, it is an injury. Every one of those insects, with the exception of the first has a number of enemies and parasites, many of which have been discovered but very recently. For example, up to the present year, no parasites were described or recorded as affecting the Web worm, but I now know of quite a number. Among such enemies there is the so-called wheel-bug (*Prionotus Cristatus*) a creature that is best characterized by a peculiar serrate cog-wheel on the back of its head, and that is further peculiar in using turpentine in cementing together its eggs. This creature destroys the caterpillars both of the Tussock-moth and the Web worm. Then there is the parasite, *Perilitus Communis*, an interesting point about which is that it forms a little brown cocoon, attached by a silken thread, and these cocoons are sometimes so numerous on the outside of the trunk of the trees which have been injured by this Web worm that the trees present a very marked appearance. Another point I want to make *en passant* is that the English sparrow has been noticed to peck away at these cocoons of the parasites but never to attack the caterpillar itself. The white-washing does harm in destroying some of these parasites and also in destroying the egg masses of spiders that also attack the caterpillars.

As to the tree boxes, while they may be necessary on account of the injury that without them, horses and other animals as well as mischievous boys would inflict upon the trees, at least until these have attained a certain size, they are always harmful. They injure the trees by chafing and by the pressure of the bandages, and when of wood, as they are in the city of Washington, they are particularly injurious, because they serve as nidi for different insects. If the laws cannot be made so strict as to prevent injury from horses or lads, then I would advise the use of round iron boxes.

I wish also to say a few words with reference to birds and especially in regard to the English sparrow, because there is a prevalent opinion, more or less sentimental, that the English sparrow helps us in our warfare against these defoliators. In point of fact, there is not one of the four insects mentioned but has some protection against most birds. The Elm-leaf-beetle is never attacked by birds because of an offensive odor. The Bag worm is effectually protected by its tough bag of silk. The Orgyia is effectually protected by its hairs and these are more or less mixed in the cocoons and the Hyphantria by both its hairs and web. A few native birds are known to attack the last two. The yellow-billed and black-billed cuckoos, the screech-owl, the common robin, and the Baltimore oriole have been known to attack them occasionally, but the English sparrow, which is the bird we should look to for assistance because of its prevalence in our cities is the very bird that has never been known to attack any one of them, and I believe that it is the increase of the English sparrow that has been indirectly the cause of the increase of these insects, for by preying upon the smooth green worms which are not so troublesome and never were, they have given opportunity and room for these hairy worms to multiply. It is a very general law in nature that if you take away one species of organism you give an opportunity for another organism to take its place and in this way, the increase of the Web-worm and of other insects which the sparrow does not touch, is indirectly due to the increase of that bird in our cities. Another reason also why they are more injurious—for it is true that none of these insects are as injurious in the woods as in the cities—is the protection they get by tree boxes and the shelter of our houses.

Mr. Pellew: To what is the decrease in the measuring worm due, if not to the sparrow?

Prof. Riley: Partly to the fact that it has been effectually exterminated in all the older cities, like Boston and Cambridge, by man, who has bandaged the trunks with tar. That has been very effectual, I have no doubt, because it is just as abundant yet in orchards that have not been so treated. The second cause is probably the English sparrow. The English sparrow is said to feed on the canker worm in the breeding season. I cannot say it is so. I do not know of any absolute observations which are reliable which will give us the positive fact that the English sparrow does feed upon the canker worm, though as it is a smooth worm and has no protective property, either by odor or hairs, it is probable that the sparrow will take it. But the other and worse hairy pests have increased. In the case of the canker worm, we have an insect which was very troublesome and defoliated the trees in early spring just as soon as the leaves were out, but in the beginning of May here, or by the end of May in the New England States, it vanished, entering the ground and remaining there in the chrysalis state all through the summer, fall and the winter months until the next spring. In the case of this Tussock moth, we are troubled with it all through the growing part of the year. In other words, we have exchanged for a species which was single-brooded and which occurred only in the larva state for a limited period, a hairy caterpillar which is double brooded and occurs all through the summer and autumn and which further forms its cocoon above ground and disfigures our houses and trees by the masses of these cocoons formed upon them. I had intended to make some remarks on imported insects and on the importance of the knowledge of the habits of insects, but have already occupied too much time. I think this last however, is pretty well illustrated in connection with the insect you have asked me about—the Elm-leaf-beetle, because it is an historical fact that many years ago the city fathers of Baltimore found their elm trees being defoliated and blighted just as those in Cambridge were, and learning that the people of Cambridge were using troughs of oil around their grand elms, as a protection, went to work and ordered similar troughs to be put around their own trees. But it did not help. What was the reason? In Cambridge, the trees were suffering from the canker worm, (*Paleacrita vernata*) which in the female state is wingless and has to climb up the tree. Therefore these oil troughs or bandages of tar impeded her progress and the leaves were protected. But in Baltimore, they were troubled with the Elm-leaf-beetle with very different habits. This shows the importance of knowing just what you have to deal with and I might extend and elaborate this argument to show you how important it is to prevent the introduction of foreign pests. I have incidentally stated that all our worst pests and worst weeds are importations from Europe. Just now in Australia they are suffering from a plague of rabbits, introduced from Europe and we are almost threatened with their importation from that country although we have been free from the European rabbit as a direct importation for three centuries. It would be a greivous pest and a cargo was actually shipped to San Francisco and had to be stopped by the authorities. My friend on the right mentioned in conversation that he had such a hatred of England that he thought he would introduce the mosquito there. Alas, as I know to my sorrow, it is already colonized in some parts of London, for I never suffered more from it than in the Grosvernor Hotel. I do not know of anything that cauld be done to produce more injury to the United States than the introduction of some of the plagues from foreign countries that now annoy them. For instance, take the tsetse fly in Africa. If it were introduced here, it would probably be more disastrous than any army of foreign soldiers bent on war, because our stock would vanish before it just as is the case in Africa. In California to-day the fruit growers are suffering grievously from a pest (*Iceryapurchasi*) that was introduced from the southern hemisphere. It probably originated in New Zealand, was introduced from there to Australia and from Australia to Cape Colony, and from either Cape Colony or Australia to California. It is to-day more injurious to the fruits generally of California than all other insects, and if it gets east, it will prove more injurious than any we now have. You know the history of the grape phylloxera. What has not France suffered from its ravages? I strongly urged in 1871 the prevention of its introduction into California from the Eastern States or from France, but the advice was unheeded and the Napa and Sonoma valleys have suffered from it a thousand fold more than the necessary cost of officers to stop it. In Connecticut, you have to day a new pest of the pear, which seems as yet to be limited to a very small area. It is a European insect, unknown anywhere else in this country and ruins the pear crop wherever it spreads. It could be now probably suppressed if the Department of Agriculture had the power to defray the expense of suppressing it. But there is no such authority. What is the consequence? It may spread over the country just as the cabbage worm did, and just as many others of these pests are now pushing over the country. It is an important matter and you in the city of New York, the great harbor of the country can probably in the future do more to prevent the introduction and the spread westward all over the country of foreign pests of this kind than the people of any other port or city. I do not see why, because these creatures are small in size and apparently insignificant, they should not be dealt with in the same way as the diseases of domestic animals. You do not hesitate to vote millions to exterminate pleuro pneumonia and I maintain that the introduction of foreign diseases in the way of insects is equally important, for though it does not appeal to your pocket so directly, it in the end does as much harm. The ravages of injurious insects in this country in the aggregate foot up to enormous sums and have been variously estimated at from $300,000,000, to $400,000,000 annually, taking the whole United States together. Past losses from introduced species have been enormous enough to justify precautionary measures.

Dr. J. A. Lintner then said: I am gratified at the invitation that you have given me to meet with you this evening and to make some remarks upon the subject that you have chosen for your evening's discussion, as it shows an appreciation on your part of the great interest of agriculture, the greatest of our national interests and that which lies at the basis of our national wealth. And to-day, the science of economic entomology is prepared to render very great service to that interest. I think there are no investigations that are being undertaken at the present time that are able to render equal aid to agriculture as is the study of our injurious insects. This will appear when you recall the fact that insects seem to be endowed with a spirit of omnipresence. They not only invade our fields, our gardens, our orchards, our forests, but they also invade our homes and they hold high carnival in our furniture, in our clothing, in our food, in our medicines even, and they infest our books. Many of them are parasitic upon our domestic animals and under some conditions and in certain localities they are parasitic even upon man. And then, too, the incredible number of insects is always a surprise to us. As you have been told this evening by Dr. Riley, insects are more numerous in species than all other classes of the animal kingdom combined. The 320,000 species that have already been described are but a small part of the insects of the globe. I have no doubt, if we had a full catalogue of the insects of the world, the number would extend up to 1,000,000 of species. The 320,000 species that we know now is four times the number we knew 50 years ago, and at the present time, there are thousands in our large collections that are waiting the opportunity of description. And then, too, when we come to regard the number of individuals of the species, it is something appalling. The fabulous fecundity of the herring of which we are told pales before that of the insect world. Recall, if you please, those hordes of the Rocky Mountain locust which at times swept over our western territories, carrying desolation, poverty and starvation in their train. There is the aphis, about which computations have shown that in a single season, a single family may be the progenitor of 27,000,000,000 of individuals. All these insect forms, or at least very many of them, live at the expense of the choicest products of our toil and hence there arises a continual antagonism between them and man. I suppose that crop is not grown that insects do not tithe; frequently, they will claim the moiety; and occasionally they are not satisfied with anything short of the entirety, as was the case with the wheat midge, which, as you will all remember, a few years ago necessitated the cessation of wheat culture throughout the State of New York. There are those of our scientific men who from their assumed heights of abstract study sometimes look down upon the work of the economic entomologist. They call it utilitarian; they say it deals only with dollars and cents. But may I ask you, What study there is that is more deserving of the best powers and energies of man than those which concern the happiness and the well being and the wealth of his fellowmen? The science of economic entomology is comparatively a new one among us. It had its rise within the memory probably of you all. It is not half a century old. It may be said to have had its foundation in the labors and writings of Dr. Fitch, of our State. The latter commenced in the year 1845 and terminated in 1872. He was preceded somewhat by Dr. Harris, of Cambridge, Mass., and in that admirable treatise on injurious insects which he has given us we have a work which has never been surpassed anywhere in the world, I suppose, in the department of natural history. The 14 reports of Dr. Fitch laid the way for similar work and similar reports in other States of the Union, notably in the State of Missouri, whence we have the nine reports by Dr. Riley, each one of which is a mine of entomological wealth. Following the states, the work was taken up by the Department of Agriculture at Washington in the establishment of an entomological bureau which for several years was favored with the guiding and directing hand of the distinguished

Ex-Commissioner who is your guest this evening. Not to review the progress of economic entomology, suffice it to say that to-day in the United States in the knowledge of the life histories of insects and in the means and methods of preventing their ravages, we stand far in advance of any country in the globe. This proved pre-eminence, of which we have a right to boast, it is but just that you gentlemen should know, if you are not already in possession of the fact, is due to the untiring zeal and distinguished ability which for the last 20 years has characterized the investigations and the personal observations in almost every State of the Union and in the countries of Europe of the present chief of the Entomological Department at Washington, Dr. Riley. It is not proper perhaps that in his presence I should review what he has accomplished in that department of study, but if that man who causes two blades of grass to grow where but one grew before may be regarded as a public benefactor, then he who has put it in the power of the Southern planter to grow three bales of cotton where but one matured before certainly is entitled to the gratitude of our people through all future time and that science which has made possible such results is worthy of your highest esteem.

The study of insects has been forced upon us. It is an absolute necessity to us. We have not only our hosts of native species with which we have to contend but America has been, it seems, the asylum of injurious pests from every part of the globe, brought hither by commerce. As you have been told, we have nearly all of the most injurious pests of Europe. I might cite the wheat midge, probably the Hessian fly although it was not brought over by the Hessians as popularly supposed, the apple worm, the bore worm of the Southern cotton fields, the apple tree aphis, the green aphis, the score or more of the most injurious cut worms and many others. With their introduction hither, all of them have developed, as it seems, a greater degree of voracity and they have taken upon themselves new habits and uniformly for the worse. They have been brought hither without the parasites that in their old homes had surrounded them and had learned to keep them in check. They come here without any of their natural enemies and they increase and multiply in a way that was before alluded to. Probably the principal reason of the increased ravages of insects in this country may be ascribed to the very large massing of special crops in this country. Nowhere else are crops grown upon the scale that they are here. Nowhere else would you find a potato field of 150 acres, a cabbage field of 200 acres, an apple orchard of 300 acres, a peach orchard of 600 acres, a vineyard of 1,000 acres, a cotton plantation of 6,500 acres, an oatfield of 12,000 acres and a wheat field of 36,000 acres, such as we have in the West and one side of which measures 17 miles. All this massing of special crops, as might be shown to you, wonderfully stimulates and promotes insect fecundity. But I may be dwelling too long upon these general remarks and I will pass to the subject on which I was expected to speak to you—upon some of our fruit insects. They are multiplying rapidly among us—very often by means of their deserting their native plants on which they feed and being drawn to our cultivated fruits which they find far more attractive and agreeable to them—and then also we become the better acquainted with them as we make them a study. A few years ago I published a list of the insects then known to be depredators upon our apple trees. It was 176 in number. Since then, I have been able to add 28 to that number so that now we have 204 different species depredating upon the apple. Perhaps the most serious apple depredator that you have in this vicinity is the spring canker worm to which reference has already been made (*Anisopteryx Vernata*). It is perfectly inexcusable that this insect should be permitted to defoliate our apple trees as it is doing. It is an insect that can be very easily controlled, and should be. It is a local insect, and as you have heard, the female is wingless and cannot be transported from one locality to another unless it is transported thither. The eggs are deposited upon the branches of the trees, and the caterpillars hatch there and descend the trunk. In the spring when the moth emerges, by instinct she seeks the trunk of the tree, ascends it and there deposits her eggs for another brood. Whatever will keep the wingless female from ascending the trunk of the tree will give you entire protection for your trees. This has been done very extensively by the bands and the vessels of oil, of which you have been told, but if this is neglected and the tree becomes infected with caterpillars, then it is necessary to destroy them by the use of the arsenical preparations—by spraying the trees with arsenic. They are to be controlled with perfect ease. Usually the first indication of the presence of this pest is noticed upon a single tree in the orchard, and as the insect has very little powers of locomotion, it should be confined to that tree. It need not be allowed to extend throughout the whole orchard and it should certainly not be communicated to neighboring orchards. You have also of late been troubled with another apple tree insect which is more abundant in the Eastern States than with us, but which is rapidly extending over the river counties. It is known as the apple maggot (*Trypheta Pomonella*). A number of small flies deposit their eggs upon the apple; these burrow in the fruit and in that way completely honeycomb it, while the exterior of the fruit is apparently perfectly sound and without any visible mark of the mischief that is going on within it. Unfortunately, we are not yet in possession of the entire life history of this insect, and until we are, we are not prepared to give the best remedies for its control. We do not yet know where this insect pupates. If it should pupate principally in the ground beneath the tree, then our energies should be directed to destroying it in the pupa state, which can be done by disturbing the ground. It is very desirable that more study should be given to it, as it is becoming a very serious pest, particularly to our early apples. The common apple tree worm which has been so familiar to you all for a long time and to which we owe so much of our worm-eaten fruit is also another insect that can be controlled with proper care. The perfect insect of the apple worm is a minute moth which very few of you have, I suppose, ever seen. It is rarely seen by anyone except the eye of the Entomologist. This moth has the universal habit of depositing its egg in the young apple just after it is out of bloom, when the apple is about setting in the calix end. It there deposits a single egg and the insect burrows in the fruit, if left undisturbed and produces the appearance of a worm-eaten apple. But if, just at this time, the tree be sprayed with Paris green and water, the young larva, as it hatches from the egg in that very tender stage will invariably be killed in the attempt to penetrate the apple and no harm will come to the apple. As an illustration of the ease and efficiency of this method of protection, I have known a case where a gentleman reported to me that in his orchard in Schoharie County in this State, by spraying his trees three or four times in the early season he gathered 1,000 bushels of apples, while in the adjoining orchard, separated only by a fence and where this protection was not resorted to, six bushels were gathered as the crop. Another insect which is troubling you very much in this vicinity—at least I have never seen it so prevalent as it was last season—is the apple tree aphis. But it was a most remarkable year for the aphides; I have never known them to be so numerous, and they almost completely ruined the hop crop, cutting it off so that many were not harvested at all. This is an insect which it is rather difficult to contend with, as it is not one of those that feed on the leaves and it cannot therefore be reached by any arsenical preparation. It belongs to the order of Hemoptera, or sucking insects, and takes its food through a proboscis. Apply whatever amount of poison you please to the trees, cover them with Paris green, still this little proboscis is thrust through the epidermis of the leaf, and it draws its pure undiluted sap from it. It has been claimed that showering or spraying the trees with a solution of soapsuds and tobacco will destroy the aphides, but this has been found to be ineffectual except in case of the insect being very young. It will destroy the younger aphides but not the old ones. It can be reached however by one of the emulsions of kerosene, and for this emulsion we are again indebted to the Department of Entomology at Washington in giving us methods of emulsifying kerosene so that it can be used with great safety. Kerosene oil is probably the best insecticide we have. It is fatal to any insect it touches, but unfortunately it is also, undiluted, fatal to most of the trees on which it is thrown. But we have been now shown that it can be emulsified so that it will admit of dilution. The formula given by the department at Washington is one gallon of water and half a pound of soft soap to two gallons of kerosene, this to be mixed, preferably heated, and then put in a vessel and violently shaken by force of a force pump, dropping the pump in the vessel containing this mixture and passing it through the force pump in a spray. In the course of 10 or 15 minutes by this process the solution becomes emulsified and of a uniform consistency, looking something like cream. That, for use, needs to be diluted by about ten times the amount of water, when you get the kerosene in the proportion of about one in 16. If this be used for the apple tree aphis or for any other kind of aphis, it will be fatal to it and it is fatal to any of these sucking insects. We have a large class of insects which take their food in this way and that can only be reached by some preparation that will reach them externally. You cannot poison them as I said before because they do not feed on the foliage. You have also been troubled very much by an aphis which attacks the cherry trees, a black insect, which you probably all know the appearance of, sometimes covering the trees so that the leaves look fairly black with the number feeding on them. This can also be destroyed by the same kerosene emulsion. There are a few barkborers that infest the apple trees to a very serious extent. One of them is known by the scientific name of *Xyleborus Pyri* and it has another similar form, the *Xyleborus Obesus.* There is also a little barkborer which very recently has made its appearance on apple trees in this country for the first time. It was brought to my notice for the first time only a few months ago and I am told it was never observed before on the apple tree. It is a European insect, introduced here some years ago, and has been preying on the trees, but for some reason it has now found the apple tree very attractive to it. It is known as *Scolytus Regulosus* and I have had twigs of apple trees on which I am rearing large numbers of this species. The insect would be very injurious to the tree, for it is very difficult of control and its work is done between the bark and the sapwood. They undergo their transformation and then emerge through the bark in minute holes about the size of pin holes. We scarcely know of a remedy for these little barkborers, but I have thought that that remedy which Dr. Riley has rather discountenanced of whitewashing the trees would be beneficial in this case. It is probable that all the beetles emerge and bore upon the bark of a tree and that the eggs are then deposited in the crevices of the bark. If we whitewash the trees just at the time when they are making their appearance, I am very strongly of the opinion that the strength of the lime will destroy their eggs and prevent the multiplication of the insect. Another injurious pest of your fruit trees is the *Plum Curculio.* Unfortunately, it is also a very difficult insect to control, and we know of no better way than that of jarring the trees, collecting the perfect beetles as they fall and destroying them. A feasible method of bringing them from the tree is to place iron wedges in the upper limbs and then give these a sudden sharp rap with the hammer, when the beetles at once fold up their legs and drop from the tree. They can then be easily collected and burned but we know of nothing that will prevent the insect from depositing its egg. We have been told that putting tar or some offensive substance on the trees, or perhaps sprinkling them with lime, would prevent the depositing of the egg, but these have been found to be fruitless and there is nothing left but destroying them in the manner I have described. The peach tree borer you have also in very large numbers in this vicinity but more particularly in New Jersey, where peaches are grown very extensively. That, as you doubtless know, is caused by the caterpillar of a moth which undergoes its transformation at the base of the trunk of the tree. It there produces an unsightly wound beneath the bark, causing the bark to peel off. In the same position, it forms itself up into a cocoon. The method usually recommended for controlling that is to draw away a little earth from the base of the tree and reveal the position of the cocoon or the larva at work and to kill the larva. It is claimed that the moth can be prevented from depositing her eggs if at about the time that she makes her appearance abroad, the base of the tree be mounded with sand or earth to the height of perhaps a few feet above the earth. A still more effectual material for mounding would be found in ashes, and I have been told by some peach growers that they resort to no other method than simply thus mounding the trees with ashes. They claim as the rain penetrates the ashes, the lye produced there destroys the larva so that they have no further trouble with it—unleached wood ashes of course. Several years ago, though I do not know that you are troubled with it to the same extent to-day, your grape vines were defoliated by a very beautiful larva, banded in red and blue. Perhaps you would not call it beautiful on account of its destructiveness, but to the eye of the entomologist, it is certainly one of the most beautiful larva we have and the moth it produces is very beautiful too. It is known as the eight spotted Alypia—*Alypia Octomaculata*—alypia being the generic name and the specification coming from the eight yellow spots which mark the wings. At certain seasons, it has entirely defoliated the grape vines in this city. A very simple remedy or preventive of its great ravages would be found in spreading corn cobs at the base of the grape vine at about the time of the maturity of the insect. In these the larva would at once burrow, and after they had had all entered the cobs, the cobs would be burned and all the contained pupa would be destroyed. It is very probable that the well known insect powder would also destroy this larva but I have not experimented with it and do not know that the experiment has been made. We have, however, found it to be a most valuable agent for dealing with many of our injurious insects. This foreign insect powder is now grown very extensively in California and is sold in our markets at a reasonable price, perhaps not over 50 cents a pound. This is to be mixed in water and sprayed upon the leaves in the same way that we spray Paris green. It is fatal to a very large number of insects and it is coming into general use as a very efficient agent for that purpose.

A Member: We would like to hear something of the currant worm?

Dr. Lintner: The currant worm has committed very great ravages, but more in former years than at the present time. I do not know that you are now suffering greatly from it. It is fortunate that for that imported pest, we have an effectual remedy and a very simple one. We only need to apply white powdered hellebore, and the larva is killed at once. Dr. Fitch speaks very emphatically about it and says that a single touch of the powder is fatal—the larva dies as if stabbed to the heart and falls to the ground. The preventive of it would be in seeking for the eggs and not allowing the larva to mature. Very early in the season, as you pass your currant bushes, if you look at the lower leaves, you will find a multitude of small holes indicating that the larva have hatched and are commencing their work. If you looked earlier than that, you would find the eggs deposited on the ribs of the principal leaves and you could pick off the eggs. It is very unfortunate if you leave them to attain the size when they spread over the bushes, for it is then very difficult to control them unless you use the hellebore. The hellebore was used very effectively in Europe before it was used here and we have found it very efficient.

A Member: Is it sprinkled dry?

Dr. Lintner: Yes, sir; dry, and preferably when the dew is upon the ground.

A Member: The cabbage worm is now very destructive?

Dr. Lintner: That is the imported cabbage butterfly—one of the pests that Europe has given us, the date of whose introduction is known. We happen to know the date of the introduction of very few, but we do know about the time when the asparagus beetle made its appearance and we know that this cabbage butterfly was brought to Quebec about 1856. Having made its appearance there, it rapidly spread over the country, and it has now reached the Southern States, even to the Gulf, and it has crossed the Mississipi River. It is not as injurious now as it was formerly. A preventive of its ravages is simply sprinkling the cabbage plant with dry dust or anything that will make the leaves disagreeable to feed upon.

A Member: How about the potato bug?

Dr. Lintner: The potato bug is very easily kept in subjection by the use of Paris green or of purple, either dry or in liquid. There is no excuse for permitting its ravages and there should be a law compelling everyone to treat his potato patches with this substance, and prohibiting any one potato patch serving as a nursery to distribute the pest to its neighbors. It is very easily kept within control. The panacea is London purple or Paris green.

Mr. Pellew: Do you think "slung shot," a preparation used largely in Long Island, is efficient?

Dr. Lintner: Yes, that is found to be very efficient.

Dr. Riley: It is the arsenic in it that is efficient.

Mr. Chauncey M. Depew and Hon. George B. Loring also made addresses, mainly of a humorous character and the "Farmers" adjourned.

# Proceedings

of the

# New York Farmers

SEASON 1887—88.

---

PRINT
GLOBE STATIONERY AND PRINTING CO.,
89 LIBERTY STREET,
NEW YORK.

## MEMBERS.

—:o:—

Mr. Daniel F. Appleton.
Mr. John S. Barnes.
Mr. Fred Billings.
Mr. J. Nelson Borland.
Mr. John Borland.
Mr. Frederic Bronson.
Mr. George H. Brown,
Mr. James A. Burden.
Mr. George F. Baker.
Mr. LeGrand B. Cannon.
Prof. Charles F. Chandler.
Mr. Joseph H. Choate.
Mr. Smith Clift.
Mr. Samuel J. Colgate.
Mr. Alfred B. Darling.
Mr. Chauncey M. Depew.
Mr. William M. Evarts.
Mr. Theodore A. Havemeyer.
Mr. Robert Hoe.
Mr. John J. Holly,
Mr. Adrian Iselin.
Mr. John Jay.
Mr. Charles Lanier.
Mr. J. Lawrence Lee.
Mr. Johnston Livingston.
Mr. Pierre Lorillard.
Mr. J. Pierpont Morgan.
Mr. J. G. McCullough.
Mr. James Otis.
Mr. George B. Post.
Mr. Frederic A. Potts.
Mr. Percy R. Pyne.
Mr. Francis R. Rives.
Mr. F. Augustus Schermerhorn.
Mr. James O. Sheldon.
Mr. Samuel Sloan.
Mr. James Stillman.
Mr. Thomas Sturgis.
Mr. Rutherford Stuyvesant.
Mr. Benjamin L. Swan.
Mr. Edwin Thorne.
Mr. Jonathan Thorne.
Mr. Samuel Thorne.
Mr. William. K. Vanderbilt.
Mr. W. Austin Wadsworth.
Mr. John Hobert Warren.
Mr. W. Seward Webb.
Mr. John D. Wing.

Dr. Cornelius R. Agnew.
Mr. William B. Dinsmore.

### COMMITTEE ON NOMINATIONS FOR MEMBERSHIP.

Mr. LeGrand B. Cannon.
Mr. John D. Wing.
Mr. Frederic Bronson.

* * *

## OFFICERS.

President, - - - Mr. FRANCIS R. RIVES.
Vice-President, - - Mr. JOHN JAY.
Sec'y and Treas., - Mr. JAMES OTIS.

Address of Sec'y and Treas., No. 22 East 10th Street.

JAMES W. TOOLEY, Stenographer.

a. A. 7970

# The

# “New York Farmers”

MET at the Hotel Brunswick on December 15th, 1887, Mr. F. R. Rives presiding.

In opening the proceedings, Mr. Rives said: Gentlemen—The hour has arrived when we are to proceed to talk upon the topic of the evening—“ Fruits such as farmers grow and their cultivation.” The most important fruit certainly in its historical record and perhaps in its present value is the apple. An apple, golden it is true, inscribed “ to the fairest ” was awarded by the champion dude and masher of his time, Paris, to one of a very aristocratic coterie of professional belles, including Venus, Juno and Minerva, thereby producing not only a frightful row between them but a sanguinary and awful war between mighty nations. All you good farmers who are so perfectly familiar with your Bibles recollect the eventful incident that occurred respecting the forbidden fruit in the exclusive and limited society of the Garden of Eden. I had occasion to send some apples, unhappily not of my own growing, to a country neighbor of Mr. Sloane’s, Governor Fish—a variety of apples before unknown to him. After eating them, he wrote me word that if such were the variety with which Eve had tempted Adam, our ancient and common ancestor was not as much to be blamed as had hitherto been thought. Voltaire is authority for the anecdote that the falling of an apple from its parent tree—a tree still standing at the beginning of this century—set Sir Isaac Newton to work at solving the law of gravitation. An apple tree of a sour variety was the kind on which it was purposed during the late unpleasantness, in song at least, to hang Jeff Davis. I am particularly happy in now saying that we have succeeded in capturing and bringing here tonight a high priest of Pomona, the tutelary spirit of this occasion—a high priest who can not only direct and guide the steps of Pomona, but also strew her path with the flowers of culture.—Mr. Wm. C. Barry.

Mr. Barry said: Mr. President and gentlemen—I thank you sincerely for your kind invitation to participate in the discussion on fruits this evening. I shall do so with considerable hesitation for I am aware that you all are thoroughly conversant with the subject, and that it will not be in my power to say anything new or perhaps important. However, lovers of fruits and flowers enjoy getting together to relate their experiences, and to rehearse the details of their successes as well as of their failures. I presume, if I tell you some of mine, I shall be considered in order. My remarks I promise you shall be very brief.

The culture of fruit is something which concerns every one, no matter what his position or occupation may be. Fruit is an important article of food, hence it demands serious consideration from all. The value of fruit as an article of food is becoming better understood and more and more appreciated every day. In these times when so much suffering is undergone from indigestion and dyspepsia, and when so much medicine is employed without avail, the fruit diet must be tried as a last resort and it generally, if not always, if persevered with, accomplishes a perfect and a lasting cure. When the system is utterly demoralized, our health almost ruined, and we suffer untold pain from sleeplessness, nervousness, and kindred troubles arising from indigestion, we begin fully to realize what importance a fruit diet has for us. This is a plain statement—not theory, but fact. It is highly important therefore that we should take the necessary precautions in time and thus avoid much suffering which is sure to follow in case we do not make proper use of the beautiful and delicate fruit Providence has given us. Fruit should be placed on the table at every meal in some form or another. The raw fruit especially possesses important qualities. Perhaps at first we may not like it, but by persevering, we shall gradually acquire a taste for it and in time, it will be found indispensable. In this country we possess exceptional advantages for the production of fruit. In few places can such a great and choice variety of fruits be raised successfully as in New York State. The soil and climate seem to be just what is required to produce handsome and high flavored fruit. In other sections more beautiful specimens may be grown but when quality is taken into consideration our fruit wins the prize every time. The apple, the pear, the cherry, the plum, the peach, the quince, the grape, and the small fruits do admirably here. These may seem to be very broad statements to make, but still they are facts. You who have traveled abroad and have seen the difficulty experienced in raising fruit in some countries—either trained upon walls or under glass or in a thousand other ways, requiring the greatest skill and care—can realize what advantages we possess here in being able to raise these fruits much better in the open air.

The principal difficulty the grower meets with is in securing varieties adapted to his particular locality. In our experience we find many things, in this regard, which are difficult to explain. We often discover that a variety, which succeeds perfectly in one place, utterly fails in another, which is but a short distance away. There is no general rule applicable to varieties. By experiment only can reliable information be obtained. Every gentleman's estate should have an apple orchard, proportioned to the extent of the estate and the number of persons to be supplied. Thirty to forty trees to the acre are the usual number. The orchard should be large enough, as, if more apples are produced than are needed for the family the surplus can be disposed of profitably. The varieties should include dessert fruits, cooking or kitchen fruits and cider fruits, and there is no better cider fruit than Golden Russet which is also a good table fruit. And in this connection I may say that it is within the power of everyone to manufacture their own cider. Cider, if manufactured in a proper way, is one of the most delightful of beverages, especially in summer. There is a great difference in manufacturing cider yourself and in buying the cider that comes from the mill or that is made by some one else. According to the way cider is usually manufactured, all kinds of apples, poor and good, are mixed in together, and really, when you buy it, you get no good cider; whereas if you manufacture it yourself under your own eyes, you know that only good fruit is employed, and then you have something that is equal to, if not better than the best of champagnes. To-day, in this country, there is a growing disposition on the part of a great many men to drink cider in preference to champagne—that is, for health's sake.

Every gentleman's estate should also have an ample fruit garden where fruits that require special care and culture may be grown. These are dwarf apple trees—not only useful but beautiful, planted six to eight feet apart; dwarf pears, ten to twelve feet apart; standard pears, fifteen to twenty feet apart; peaches, plums and cherries, fifteen to twenty feet apart; quinces, twelve to fifteen feet apart, and all the small fruits in abundance. The fruit garden should consist of several acres, for a surplus of fine fruits will always sell for good prices.

The fruit garden should be so arranged and planted that the work of cultivation may be nearly all done by a horse. The ground for orchard or garden should be thoroughly prepared by deep plowings, using the sub-soiler after the common plow, and breaking up the soil to the depth of eighteen or twenty inches. I will now give a few lists of the choicest fruits for orchard or garden purposes, for example;

25 CHOICE APPLES.

*Summer*—Red Astrachan, Primate, Early Harvest.

*Fall*—Fall Pippin, Fameuse, Gravenstein, Maiden Blush, Oldenburg.

*Winter*—Baldwin, Spitzenburg, Golden Russet, Jonathan, Ladies' Sweet, Talman's Sweet, Northern Spy, R. I. Greening, Sutton Beauty, Twenty Ounce, Yellow Bellflower, King Tompkins Co., Hubbardston, Nonsuch Mother, Transcendent, Hyslops, Lady Apple.

18 CHOICE PEARS.

*Summer*—Bartlett, Giffard, Clapp's Favorite, Tyson.

*Autumn*—Angouleme, Bosc, Hardy Seckel, Sheldon, Superfine, Bensseck.

*Winter*—Anjou, Clairgean, Lawrence, Reeder, Winter Nelis, Duhamel du Monceau, Josephine de Malines, Jones Seedling.

10 CHERRIES.

Black Tartarian, Windsor, Yellow Spanish, Nap Bigarrean, Gov. Wood, Montmorency Ordinaire, Arch Duke, May Duke, Elton, Tradescants Black.

10 PLUMS.

Reine Claude, Bradshaw, McLaughlin, Coes Golden Drop, Fillensbury, German Prune, Smith's Orleans, Prince Engelbert, Yellow Egg, Green Gage.

11 PEACHES.

Alexander, Rivers, Haine's Early, Coolidge's Favorite, Crawford's Early, Foster, Old Mixon, Tree Stump, Morris White, Crawford's Late and Ward's Late.

5 APRICOTS.

Alberge de Montgant, Large Early, Royal, Peach, St. Ambroise.

3 NECTARINES.

Lord Napier, Milton, Newton.

2 QUINCES.

Reas and Orange, or Apple.

13 GRAPES.

Concord, Brighton, Delaware, Rebecca, Moore's Early, Niagara, Agawam, Salem, Lindley, Catawba, Gaertner, Wilder, Herbert.

6 BLACKBERRIES.

Kittating, Lawton, Ancient Briton, Agawam, Snyder, Early Harvest.

6 CURRANTS.

Cherry, Fay's Prolific, Victoria, White Grape, London Red, Black English.

5 GOOSEBERRIES.

Industry, Crown Bob, Whitesmith, Downing, Smith's.

RASPBERRIES.

Clarke, Knevitt's Giant, Orange, Herstine, Cuthbert, Marlboro, Rancocus.

RASPBERRIES BLACK.

Gregg, Sonhegan.

I may add that there is a great field for fruit culture in this country, if it is undertaken in the proper manner. The grape, for instance, can be made into the most delicious wine. A great many attempts have been made in various parts of the country to produce a native wine which would compare favorably with the European article, but up to this time, for some reason or another, these attempts have not been successful. Yet, while I do not care to refer to myself too much, we make in Rochester an excellent wine, and as it is unadulterated and perfectly pure, I am satisfied that it can be used with a great deal more satisfaction and security than European wines, a large number of which, it is a well-known fact, are more or less "doctored." I have no doubt that in a few years we shall have a wine generally made which shall be palatable and good enough to drink. The grape, as it is raised here in the open air, is really a wonderful fruit and the varieties are innumerable—enough both as to flavor and quality to suit every taste. In our vineyards at Rochester we have over 150 varieties that we are testing. A great many of them you would consider of no value, but some have remarkable qualities. Take the Brighton, for example. I have tasted a great many foreign grapes, both on this side of the Atlantic and on the other, and I think I can candidly say that in my opinion there is not another grape in the world that can compare with a well-ripened Brighton—and remember it is an out-door grape grown in the open air by hundreds of people without any difficulty and without the exercise of any special skill. In Paris, I have bought grapes on the stands there that were simply colored—that were not ripened—and there is no pleasure in eating such a grape as that; indeed, they do you harm instead of good and yet these people could not get anything better. I remember also that once when I was coming across from Liverpool and wished to bring some grapes on the steamer, I had to go through the markets several times from stall to stall in order to get a perfectly ripened grape. They send the grapes to market before they are thoroughly ripened, and an unripe grape is about as poor a thing as you can eat.

The possibilities with regard to other fruits are also very great. Take the apple. We know what the apple crop of western New York means to the railroads that carry car load upon car load of them to New York to ship abroad; it means millions of dollars, and a failure of the apple crop entails an enormous pecuniary loss to the people of the state. Then there is the peach. What fruit is more delicious! And what pleasure is there more gratifying than for a gentleman to go out in his own garden and gather his own fruit! These fruits were given to us for a purpose and if we do not enjoy them, we are deficient in a very important branch of education. The peach too, as we grow it—in the open air—cannot be equalled by any peach grown under glass. Then look at our pears—such a pear as this beautiful Anjou which lies on the table before me! But good fruit is the reward of unceasing attention. Some people plant trees and think that then the work is done; they expect them to blossom and then that they are going to pick great pears from them without expending any more trouble. But not so! In fruit raising, as in everything else, the most successful business is that which is best looked after.

Mr. Jay: Can you recommend any special manures?

Mr. Barry: We have never used anything ourselves but barn-yard manure, for the reason that we knew exactly what it contained. These fertilizers may be very good, but we have never been able to feel sure that they were just what we wanted. Then in Rochester, barn-yard manure is very easily to be had.

Mr. Jay: That applies to peaches?

Mr. Barry: Yes, sir; peaches require a good deal of manure and they also require to be pruned occasionally. But the important point with regard to all fruit trees is to give them plenty of nourishment.

Mr. Cannon: I do not want my friend Mr. Otis to be too much encouraged. He lives in Long Island—on a sand bank. Do you think it is possible upon such a soil as that to produce excellent fruit? And is it not absolutely essential to the raising of the most excellent fruit that you should be on a lime stone?

Mr. Barry: No, sir; I do not think that is absolutely necessary but I think it will be difficult to raise fruit on a sand bank—so difficult that I would not advise anyone to undertake it. But if I had a sand bank, in order to have fruit for my family, I should dispose of the sand bank and buy good land somewhere else.

Mr. Burden: Can you tell us something about the pear blight?

Mr. Barry: That is something which no one yet understands. It is as yet as much a puzzle as consumption is among human diseases to the physicians.

Mr. Cannon: Is it not true that the highest excellence in the animal and vegetable kingdom has only been attained where you get the phosphates on the lime stone foundation? I will make it general,—are not phosphates in the soil absolutely indispensable to the highest perfection of animals and vegetables—to the production of the best fruit, the best vegetables, the largest animals and the largest men?

Mr. Barry: That may be very true, but if we are unfortunate enough to have a piece of property which is not adopted to our purpose naturally, we can, without going to an unreasonable expense, do a great deal towards making that land what we want it to be. If you wish to plant pear trees on a sand bank, you can excavate a hole four or five feet in diameter and remove that poor soil and put in its place good soil from some other neighborhood and then the trees will flourish.

Mr. Cannon: Why is it that the fruits produced on the California coast in the volcanic formation, where you get the results of sulphur and of iron, certainly in regard to size—I am not talking about excellence in quality—show extraordinary results?

Mr. Barry: That I cannot explain. There is unquestionably in the soil and climate of that country something remarkable in the way of producing fruit, but after all, the fruit cannot compare with the fruits of the East. I may add that in my opinion, there are perhaps surprises in store for us when fruit raising is attempted in some of the new and practically untried territories. Experiment alone can make us know the true capabilities of any soil.

Mr. Jay: What is the lifetime of the peach in Rochester?

Mr. Barry: The peach will last probably five or six years—a good peach orchard.

Mr. Jay: Five or six bearing years?

Mr. Barry: Yes, sir. There is a grub which attacks the peaches up there and which gives us a good deal of trouble. But if you will have some one go over the trees and pry out these grubs from their burrows, the trees will live a long while; and if you let them alone, they will soon destroy the tree.

Mr. Jay: What are the evidences of the existence of the grub?

Mr. Barry: It shows on the outer edge—a little rough surface—and if you open that with a knife or a wire, you will find the fellow there and he is at work. You have to look after him in the winter as well as the summer.

Mr. Jay: How large is this worm?

Mr. Barry: It is a small white worm. It is in the plum, too.

A member: Is that what is called the curcullio?

Mr. Barry: No, sir; the curcullio is a small fly that attacks the fruit only and never the foliage. The curcullio is so small that it has to be cast on a white sheet to discover it.

Mr. Jay: How do you fight the curcullio?

Mr. Barry: The curcullio is easily destroyed. It is a little animal that in May, just while the fruit is forming, attacks it and makes a crescent shaped cut. Now, in the early morning at that time of the year, it is usually chilly and cold and they are stiff, and if you spread a sheet round the tree, and then club the tree with a club having something wound round it so as not to bruise the tree, the shaking of the tree will bring down the curcullios. You will find a great many--sometimes 15 or 20 from a tree You practice that operation every morning for about three weeks, and at the end of that time, the fruit has become so hard that the curcullio cannot make any impression on it, and you have your plum crop secured.

Another important thing is the cultivation of the soil round the trees. A great many farmers allow crops to grow round the trees, and then some bungling man comes in with his horse and barks the tree and injures it, and gradually the trees grow less by dying out, and they are not replaced, and when that apple or pear orchard should be in perfection, there is no orchard there. While it is possible and practicable to plant a few potatoes between the rows, if apples are planted 35 or 40 feet apart, they should never be planted so close to the trees as to endanger them. Our help, as you know, are sometimes very careless and they let the horses nip the trees or allow the cultivators to bruise them and then they are injured for all time to come. And if you allow grass or anything else to grow close to the trees, you impoverish the soil and there is not enough nourishment left in the soil to enable the tree to grow. When you plant an orchard, you should give it the same attention that you ought to give yourself or your family—treat it fairly and you will get good returns.

Mr. Potts: Does that apply to old apple orchards?

Mr. Barry: Yes, sir. And if they are not vigorous, plow up the soil, but plow very carefully. In old orchards, the roots run along the surface and careless plowing would destroy a great many roots. After plowing, put on manure, and then the trees will soon be again in a healthy and vigorous condition. Young trees, and especially when they are bearing large quantities of fruit should receive a great deal of nourishment.

Mr. Otis: The pears you have shown us—have they been matured in a drawer?

Mr. Barry: Those have been kept, since the cold weather came on, in a storage house. We have a house where we keep the fruit all the winter —a house where the temperature never is allowed to go below freezing and where it is usually one degree above freezing. In case of very severe weather, mats and blankets are placed over the fruit.

Mr. Cannon: Do you keep them in masses?

Mr. Barry: Yes, sir; they are placed in boxes so that they can be easily covered at any time. One of these houses can be built at a very small cost and is indispensable if you wish to have fruit till February or March. This (showing a pear) is really a November pear, but it can be kept till March, just as well as not in these storage rooms. And so can any other fruit; grapes can be kept just as well up to that time.

Mr. Thorne; And retain their flavor?

Mr. Barry: Yes, sir; but there must not be anything placed near the fruit that would impart a disagreeable odor to the fruit. Sometimes it is packed in sawdust; that is very injurious, because the flavor of the pine is communicated to the fruit and gives it a disagreeable taste.

Mr. Rives: We are fortuuate in having with us this evening one of our British cousins, an officer in the grenadier guards, who takes as much interest in the victories of peace as he does in those of war, and who for the time is glad to turn his sword into a plowshare, and I believe he would be glad to ask Mr. Barry a question or two on this subject.

Capt. Lloyd: I am afraid that I do not know much about agriculture, although my father is an agriculturist to a certain extent and everybody in England is more or less interested in it, because our agriculture is certainly not what it was thirty years ago, nor even what it was ten years ago. The question I wish to ask is whether there is any possibility or probability of fruit culture in any way helping us out of the difficulty in which we are placed. Although my trade is now soldiering, I may in the future have to turn my attention to agriculture, and therefore I shall be most grateful if Mr. Barry can enlighten me in this matter.

Mr. Burden: Won't you tell us something about the decline of agriculture in England?

Capt. Lloyd: Well, my father owns an estate in the country of some 4,000 or 5,000 acres which is and has been cultivated in one of the best parts of England and a part which has suffered perhaps less from the depression than many other parts. Yet that estate is probably worth only two-thirds of what it was ten years ago, and it is not worth half as much as it was twenty years ago. That estate is one on which the great experiment of "three acres and a cow" has been tried for about forty years, and we have found that unless a man has had the opportunity of working in other directions as well, the "three acres and a cow" has not answered. At present, it is very difficult with us for the large farmer to live and I do not see how the small farmer can exist.

Mr. Barry: In reply to Capt. Lloyd, I can only say with regard to England as to this country that we can certainly make a more profitable use of our lands in raising fruit than in raising wheat. Wheat at eighty cents a bushel cannot be a very profitable crop for the farmer; certainly pears at $7 a bushel is much more profitable. But fruit culture must be intelligently followed; it is just like any other business—if you know how to do it, it succeeds and if you do not, it fails.

Mr. Otis: Do you suppose the American Pippin, raised on the North River and in Columbia County and shipped in large quantities could be raised in the damp climate of England?

Mr. Barry: That would be impossible for me to answer, because with fruits, the differences of climate and soil have so great an effect that no one can foretell what will be the result in a particular case. The only way to determine the fact is by experiment. We have sent a great number of Pippin trees to England to be tested and perhaps in some sections they will succeed. We have also been sending our American grapes to England to be tested, but the English regard them as of no value. They think, strange to say, that they are not palatable.

Mr. Thorne: Not even as grown here?

Mr. Barry: No, sir; there is a foxiness, they say, about the American grape which is unpleasant to their taste. I cannot explain this, for in my opinion, there is no foxiness in the Brighton or in a well ripened Catawba.

Mr. Jay: What time does the Brighton ripen?

Mr. Barry: Early; it is an early grape; it is never cut by frost.

Mr. Jay: In what month?

Mr. Barry: Early in September.

Mr. Cannon: Do you claim that there is any out door grape that is comparable with the Black Hamburg as a dessert grape?

Mr. Barry: Yes, sir; I would much prefer the Brighton grape to any Black Hamburg.

Mr. Cannon: I had really supposed that by common consent there was nothing you could eat, as you can the Black Hamburg, every day and for days and weeks together without cloying.

Mr. Barry: That is a matter of taste, and I would not of course dispute it. But if you were to put before me Brightons and Black Hamburgs I should prefer the Brighton, and I think some others would have the same preference.

Mr. Potts: Is the Brighton a comparatively new grape?

Mr. Barry. Yes, sir; it is not as old as the Catawba.

Mr. Cannon: It is a seedling from what?

Mr. Barry: I could not give you its history; it is a hybrid.

Mr. Cannon: I believe we have three native grapes and but three—the Catawba, Isabella and Scuppernong; every other grape is a seedling.

Mr. Barry: We are just beginning to find out that in this country we can get new fruits by the same methods as have been followed by the rose growers in producing new varieties of roses. The field is very wide; there is no limit to it. The idea of making new fruits ourselves!—it shows what is in our power, and if there is anything more interesting or entertaining than that, I should like to know what it is.

Mr. Thorne: Some thirty-five or forty years ago, my father sent me to buy some apple trees to set out, and one of the recommendations the nurseryman gave me was the Baldwin apple. He said he never knew anyone to get tired of eating them. Is that the case with this grape you speak of—you can eat more of them than of any other and not get cloyed?

Mr. Barry: Yes, sir; I think so, but there are a number of other excellent grapes; I only mentioned that one as particularly desirable in its way.

The Hon. Chauncey M. Depew then said: Well, Mr. Chairman, I am glad that at last you want a practical discussion of this question. We have heard to-night of the beneficial effects of fruit eating—that we knew about before—but what we are here for is fruit raising, and on that subject, I am an expert. I thought when you spoke about rhetorical pyrotechnics that you referred to my friend Cannon. I have heard him go into pyrotechnics of a rhetorical sort which surpassed anything I ever listened to in the Senate or out of it; and, if you had started to-night the question of the protection of home industry in connection with the recent extraordinary screed of the President of the United States and had called him to his feet, you would have, perhaps, learned how to raise fruit—certainly, if you had not learned how to raise fruit, you would have found out how to raise—sheol.

I came here for the purpose of finding out how to do something with my farm up at Peekskill, on which for the several hundred years we have owned it, we have grown rocks mainly, and the personal property of the family has not been improved by the product. I asked an ancestor of mine, my grandfather, what he kept the farm for and he said "some time or other they will need stone piers in New York; by that time, you will be owner of this farm and then you will be the richest man in this country." But since they have begun to manufacture and use this artificial stone of which they make piers, they have ruined that dream of my grandfather's and have driven me to become a member of this society at an expense of $40 a year, to find out how I could improve that estate. I came here to-night and by eating and drinking this dinner have secured a digestion which only fruit can remedy, if Dr. Barry is right—for the purpose of discovering whether there was anything in the line of fruit-raising which would add something to the patrimonial income. The income of the farm, I would state, since I have known it, has been principally taxes, and they have been regular and steady—and never affected by the drought—indeed the only thing that has ever impaired them has been hard times which have postponed their collection.

I was West recently—in that region where I was met and overcome by the St. Louis interviewer. I went there with the idea that the only solid foundation of wealth anywhere in this country was farming, so I delicately insinuated as I rode through the places and stopped at the stations that I was a member of the New York Farmers Club. One man asked me if farming in New York City consisted in cutting off "cow-pons." I told him no, but I would like to know how farming succeeded in his neighborhood, as I had understood that all a man needed in order to prosper was a homestead of 160 acres, and then, growing wheat at fifty-five cents a bushel, he sent it forth to feed the starving millions of Europe, and soon became a millionaire. He sat down and figured up to me what he got out of it. He ciphered just how much the seed cost him, then how much his own labor amounted to, with that of his hired man, then the feed of his team, then how much he paid for the steam thresher, then the amount of railroad freights and elevator expenses, and when he got the crop to market, he had a mortgage on his farm. I did not know if his figures were correct, but I found that many people in that country had changed their occupation and gone from agriculture into raising corner lots and that this was a most phenomenally productive industry.

Among other places, I went to a city which five years ago, had 2,000 inhabitants; to-day it has 40,000. Every citizen seemed rich. They told me, "this man is worth half a million, that man a million, that man a million and a-half, that man two millions," and it grew somewhat monotonous, and I said "what do you call a poor man here, if you have any such person?" and my informant replied, "a man who is young and in excellent health and has $100,000 has a fair start with us." They pointed out to me lots along the principal streets which they were selling at $4,000 a front foot, without any buildings on them. One of the leading citizens hired a tug and sailed with me in front of the town, because the mud was so deep you could not drive through the streets. I said to him, as I looked over the unbroken forest extending to the pole, "I see everything here except a grave-yard. Have you a cemetery? or is the land so valuable that you bury your relatives in the lake?" My friend pointed to some white stones in the distance and said, "that is our cemetery, but it is getting too valuable for such a purpose and we have got to take them up and plant them over the hill. That however, is not an unmixed evil, for my lot is on the corner of the avenue which is an extension of our principal street and of course it will become an exceedingly valuable property. It necessitates the removal of my wife—but, poor dear girl, she won't mind it, because in her lifetime she was immensely interested in the growth of the town."

Now, this fruit raising is a most interesting subject. I was afraid when the evening started with that extraordinary but charming address of our president, that the discussion might degenerate into subjects which would not meet the entire approval of Mr. Comstock. He spoke in a familiar way of Venus and other lovely but dangerous divinities of the ancients and showed an acquaintance with them which none of the rest of us enjoy. But when Mr. Barry came on with his paper, we were safely launched into the subject of the evening. There is nothing in the recollections of a man who was brought up in the country which equals those suggested by the orchard. All the poetic romancings about meadows and fields only suggest the stone boat, the plow, the rake, the harrow and the scythe, and everything which recalls hard work. But the real, solid enjoyment of country life for a boy who was born there, always centers about the apple tree. Under it were gathered all the pleasures of existence in his early life, as he recalls them in memory and reminiscence. There is not a man about this table but can remember the time when he could sit down in the orchard with half a dozen other boys and eat his hatful of apples and every one here would give all he is worth to be able to do it again.

New York is the greatest state of the commonwealths which form our union. Mr. Barry is right about that, but Rochester, though a most charming city is not as he thinks all there is of the state. He has tried hard to convey the impression that you can only raise fruits fit to eat and which will bring good prices in or about the Flour city. But then he is interested in Rochester real estate and we are not. The fruit he praises is grown at Ellwanger and Barry's, which is a most admirable place, and it is difficult anywhere in the country to compete with them, but down in Westchester, our local pride compels us to claim that we have just as good fruits, though we don't get as much for them, because they are not so well advertised. But friend Barry with all his eloquence never can get us farmers to abandon champagne and drink Barry's cider. He has tried to talk it up here to-night, but it won't go down. This is not like the societies he is accustomed to address, where they adopt the speaker's views and buy his wares. We understand the business; some of us are in it ourselves.

In New England, when I was a student at New Haven, they distilled a cider, a very peculiar beverage. You wanted a guardian appointed after you had drunk some of it, and it was at that time up in Connecticut a test of orthodoxy. If a man did not murder any of his family or friends after imbibing it, the vitalizing and resisting power of grace and education were recognized, and he became an elder in the church and the general executor for all the estates in the town, and if he did kill any one he was acquitted on the plea of emotional insanity.

A characteristic colonial clerical New England story was told me by a very eminent divine, who traced his ancestry back to Jonathan Edwards. He said, that after a congregational convention the deacons gathered about were discussing, as they always do on such occasions, the merits of their respective clergymen, and one good deacon described his as a preacher who could state the doctrines of the church better than any other man; another deacon his, as one who was best in describing the beauties of a christian life; another his, as one who could bring out the sentiment and poetry of the Old Testament, until finally a venerable deacon said, "well, our clergyman cannot do any of these things as well as you have described. We don't pay him any salary, he owns a large farm and has to get his living from it and preach for us for nothing, but he is mighty moving in prayer in curcullio and caterpillar time."

I was interested, as any one must be who has visited England, in the question asked by our friend Captain Lloyd, but I think it answers itself for an American who has been on the other side of the Atlantic in the peach season. When I was there this summer, mine host had upon his table magnificent peaches which had cost him fifty cents a piece. They had been grown upon the side of a wall and mostly under glass; they had a white pit and little flavor. I said to him, "peaches which would make your mouth water and tears of joy run down your cheeks, are to-day piled almost mountain high on barges beside the wharves in New York and selling for fifty cents a basket and with 200 peaches in each basket."

"Well," said he, "you Americans have always been remarkable for the stories you tell."

This society, if it accomplishes nothing else, does this at least—we gather these experts from all parts of this country and the world and we publish a volume at the close of the year which takes precedence of all the agricultural reports of the United States. The Commissioner of Agriculture told me, when I was last in Washington, that the only chance he had of having the commissionership of agriculture made a cabinet office was by distributing these volumes containing the transactions of our society among the members of the Senate and House of Representatives. He said that he had given a volume to several of the leading members of both houses and they had incidentally said, "if such things as this can be done in an agricultural city like New York, what might not be accomplished if agriculture had a cabinet position in the government of this country?"

As a railroad man, I am interested in the culture and growth of fruits and cereals. I want agriculture to prosper for the interest of the country at large, and because we get our best business from the farms. The larger part of the traffic which makes business for the railroads comes from the land. These gentlemen about me who mine, think they do much for railroads, but we are obliged to carry their ores for next to nothing and we buy rails of them, they say, for less than it costs to produce them, and in that way they benefit us and we foster the iron industry. The farmer too, gets the best of us every time. He controls the legislature and taxes our roads and adjusts our relations to the public about as he pleases, and we are popular largely in proportion as he makes money and we lose it, and so, as dividends get low and produce high, the country grows in harmony with railroad men and they are no longer regarded as tyrants, usurpers and oppressors of their kind. If the time ever comes when the farm and the railroad are brought into really universally harmonious relations, then a railroad man can run for president of the United States.

The Farmers then adjourned.

# The
# “New York Farmers”

MET again at the Hotel Brunswick on January 19th, 1888. Mr. F. R. Rives presided, and in opening the proceedings said:

Gentlemen—The subject for the discussion of the evening, “The Feeding of Cattle,” is one of the most important in the whole range of husbandry, for we have sixty millions of our own people engaged daily and from the cradle to the grave in the consumption of dairy products. Out of our own abundance, we spare for a valuable consideration some of those products to the inhabitants of the Old World. The great English satirist who once asked, “Who ever reads an American book?” never asked “Who ever eats an American cheese?” for he owned to me with peculiar emphasis that the best cheese he had ever eaten was American cheese. We are fortunate this evening in having with us a triumvirate of experts, both skilled and practical, and yet I cannot promise you that in their speeches they will adhere with the utmost strictness to the topic of the evening; in fact, I know that none of their speeches will be of the milk and water order. I shall first call upon the Hon. Edward Burnett, who has so kindly come to us from the great legislative council of the country where he has been placed among other distinguished men on the Committee of Agriculture, and we New York Farmers, so long as his vigilant eye is upon federal legislation, can safely “sleep o’ nights.”

Mr. Burnett said: I am not here to give you a long list of tables or to discuss the different foods for dairy cattle. But I have been asked by my associates to open the ball and I am going to tell you something about another requisite of the dairy cow and that is the care and skill needed in developing that animal. The typical dairy cow is half artificial—so to speak, made by man. I have given this a great deal of thought and study and I am ready to say that the typical dairy cow depends just about fifty per cent. on her breed and fifty per cent. on the care taken of the animal from the time of her birth until she matures. Skill is most valuable in developing these big tests. In one case that I recall, the man who attends to her is an expert—an artist—as a feeder. That cow is treated like a duchess; the feeder takes off his hat every time he goes into the barn; and I do not think he would use an oath or raise his voice above its natural level under any circumstances in her presence. Why? Because this cow, brought to this beautiful state of perfection, has such a delicate organization and is such a wonderful machine that she is easily upset—if, for instance, strange men come into the barn, while a shout or a noise will reduce the flow of her milk from five to twenty per cent. I think you will find, in the case of all these big tests, that the men who take care of those cows are in love with them; and they not only take generally the very best of care of them but their care is regular and unintermittent. The same is true of other animals. Take, for instance, the Arabian horse—What is its origin? It was a sort of a broncho. Well, of course, its masters took pains to breed from the best, but that wonderful horse has been largely the production of care. That horse, as you all know, was made the pet of the family. The favorite mare of an Arab always has the best corner in the tent. So it is with the dairy animal: to produce the best results, they have got to receive the very best of care and attention. Some men go so far in their stables as to employ women. I know of one instance—a man who has taken the first prize three consecutive years at St. Louis for the best butter and a splendid feeder, who recognizes this fact so strongly that he has two or three women among his herd of a hundred cows as milkers, and he won't have on his farm a man that is rough spoken or that will say anything before the cows that he would be ashamed to say before the women. I know that to be a fact. On the island of Jersey, you will find that the women almost entirely take care of the cows; only very rarely do you find a man there who has anything to do with the cattle; and they get some wonderful results. I remember in the parish of Grouville visiting a little bit of a farm—I think it was on the estate of Mr. Perry—a little place of an acre or an acre and a half on which the tenant kept two cows. His wife, a typical French peasant woman, had the sole charge of those cows and she took me out to show me the yearling heifers. Well, they were grand cows, ideal, typical dairy cows, and the perfect admiration that the old lady had for them won me over so completely that I made up my mind to buy the heifers at any price, as good representative Jerseys. She took her milk book and showed me the results of ten or twelve consecutive weeks. As is usual there, they had all the milk they wanted to use in the family but neither of them ate any butter. They had sold from those two cows from twenty-five to twenty-eight pounds a week, and I saw the receipts signed and paid for. Those were good cows but these results were largely obtained by the skill and care that that woman employed in handling them; and there is not a question in my mind but what she got from six to eight pounds a week from the two cows more than a man would have obtained under the same circumstances. I leave the question of feeding to my associates, but I do wish to say that I believe that this hue and cry that has been raised in the last few years of overfeeding contains a great deal of nonsense. I do not believe in it myself. I think that the majority of our dairy stock are underfed rather than overfed. Take for instance the ordinary farmer who has twenty cows in New England or in almost any part of this section of the country, and you will find that he is short of feed. Many of them are trying to keep just as many cows as possible, and they obtain no more from twenty cows than a good farmer will from ten or twelve ; and it would be cheaper for such men to sell twenty-five per cent. of the tail end of their herd and put that money into food. They would get better results and would have more money at the end of the year than they get by following the process they do now. I do not think that we are particular enough, or that we take pains enough in weeding out our poor stock. I am sorry to say that at many of the big sales that are held in this country of dairy stock, a great many of these "weeders" are sold under the hammer. I think they should be sold to the butcher—by the pound. Before closing, I wish to say what perhaps few of you gentleman realize—that the development of all thorough-bred stock is due almost entirely to gentlemen farmers. The early English breeders were all men of wealth and social position. Look what Lord Ducie has done for sheep ! And to men of the same stamp we can look for all our improvements in stock in this country. I am sure all of you will remember what Mr. Sheldon, Mr. Morris and Mr. Thorne, among the older breeders have done for us ; and to-day, we are all indebted to Mr. Appleton, and Mr. Billings, and Mr. Havemeyer and Mr. Holly, and to all of you gentlemen for what you have done and are doing for our cattle. You really are laying the foundation of the great American dairy cow by breeding and taking an interest in thorough-bred stock. So, also, the improvement among our thorough-bred horses is all due to the efforts of men of wealth and position, and it causes me a great deal of pleasure while it also places me under some embarrassment to be here and to talk to you to-night. I appreciate, and I tell the farmers, what good work you are doing ; and I hope that this club, which now contains, I think, about twice as many men as when I last had the pleasure of meeting with you, will before I meet with you again, once more double itself.

Major H. E. Alvord was next introduced and said : In the feeding of our cattle, we endeavor not only to satisfy the appetite but to feed them so judiciously, carefully and economically as to obtain certain definite and satisfactory results. In my experience, I have found that in endeavoring to do this, the average herdsmen and feeders show a general ignorance and heedlessness of the matter of feeding. They seem to have but the single idea of hay and grain or grain and hay, and very little knowledge of their proper relations to one another or the differences in these general classes of feeds and fodders, and hence the feeding problem seems to be a proper study for the owners, almost of necessity, while I think most of you will agree with me that as we enter into the study of it, it becomes a matter of great interest to so guide the work of the employes as to obtain good results, both as a matter of personal satisfaction and of economy. We must therefore study the economical position and the physiological effects of the different feeds and fodders. Oftentimes, in these days, farms are so located that the higher class of hay produced upon them is too valuable to feed. If we can sell it, its market value is such that we are inclined to do so, if we can find a proper substitute; or if it has to be fed, then its price is such that it ceases to be in many cases economical cattle food. I speak of the best of hay and consequently it is of interest to enquire whether we cannot substitute for the best of hay, coarse and swale hay, straw, corn stalks, and perhaps ensilage, as well as roots, supplementing these of course by grain, and whether in the matter of grain foods and concentrated foods generally, it is necessary to adhere to the more familiar articles of corn and wheat and oats, or whether we cannot greatly enlarge our list of concentrated food and make use largely of many of the refuse products known to the market at the present time, as for instance, malt sprouts, the grains of our breweries, the gluten meal and glucose from our sugar works, starch, cotton seed meal, the various refuse forms of bye-products of the flouring mills and the hominy mills and oatmeal factories, which last, by the way, I consider perhaps as valuable as any at the present market prices. I think we can find by a study of this subject that we can advantageously make some of these substitutions which I have indicated. First, however, we must understand some of the fundamental principles of feeding and the purposes of food. And the simplest form I think to regard food products or food substances is to classify them in the old fashioned way. Perhaps some present will take exception to its scientific accuracy, but it is substantially accurate for practical purposes. This is to classify them in the two classes of flesh forming or muscle producing substances and as heat producing or life giving substances; or, in other words, as those having the element nitrogen in addition to the oxygen and hydrogen and carbon, and the carbonaceous which are free from nitrogen. For a complete and most economical effect we must have a proper relation between these two classes of foods and this is what our books speak of as the "nutritive ratio," which with milch cows is generally placed at about one of nitrogenous substances to five and one-half of the carbonaceous or non-nitrogenous. The economical position certainly should be kept in mind in a rough way while we are dealing with food stuffs and giving orders for their purchase or use. The food should be mixed and used according to our knowledge of its composition. The tables which refer to this subject are numerous and complete and they include the important question of the degree and percentage of their digestibility which should of course be taken into account also. I do not believe it is necessary to bear in mind or to particularly refer to the exact figures in our practical use of these general facts but the characteristics of the various foods should be remembered, and their resemblances and the class to which each belong. They must be classified, of course, roughly, according to their predominating elements, and it seems to me that it is a convenience and assistance to the owner or practical feeder, even if he does not care to spend time in minute study of the very careful and accurate tables which have been prepared, to make out from them a rough table for himself for general reference simply—lists of the foods which he wishes to use or with which he has to deal, arranged in the order of their predominating elements. Such a little list I have here, and I will take but a moment to run through it. It is a list of familiar feeding stuffs arranged first according to the predominance of the nitrogenous element and subdivided into the three classes of green or succulent food, dry forage —fodders proper, as we would say—and concentrated foods or feeding stuffs.

In green or succulent food, we have clover standing at the head, because of its muscle forming properties and next to it comes pea-vines, the vines of the field peas of the North or of the cow pea of the South, and the horse bean which is being advantageously introduced even further north than this, and which we are using with favorable results in Massachusetts. Next will come rye, then the grasses of the pasture, then the various roots, ensilage, and lastly, fodder corn, which so far as this class is concerned stands at the bottom of the list of green foods. In our dry forage, we have the cow pea vine standing first, clover hay second, meadow hay third, timothy, and the straws in the order of wheat, rye and oats. In our concentrated foods, nothing compares at all in its percentage of protein or nitrogenous contents with cotton seed meal. Next to this in rank stands gluten meal, then linseed meal, pea meal, flaxseed meal—the whole seed ground in distinction to the linseed cake meal,—malt sprouts, cow peas—the pea meal being the Canada field pea and the cow pea or the pea from the South which we cannot raise here. Wheat bran stands high in this list; the difficulty is to get the animal to eat it. Then comes rye bran—then corn meal low down on the list—hominy chop, sorghum seed, starch feed, brewery grains and apple pumice. If, alongside of this list, which is arranged on the basis of value in protein or nitrogenous forming substances, we construct a list showing the foods in which the carbo-hydrates or non-nitrogenous substances are predominant, we find it entirely re-arranges itself, and among our green foods sorghum ensilage stands first as giving the most heat producing material to the 100 pounds, clover ensilage next, fodder corn, cow pea vines, rye, pasture grass, potatoes and apples, apples standing much higher in the list as far as carbonaceous matters go than they are generally credited to stand and well in advance of all our root crops. In our dry forage list, while we have clover hay and pea vines standing at the head of the list for nitrogenous substances, and corn stover nearly at the bottom, we find as heat producers, corn stover, well cured, stands first and clover hay near the bottom; and in our grains, whereas for the muscle producers, corn meal is near the bottom and cotton seed at the top, for heat producers, corn meal stands first, rye flour next, and so until we come to cotton seed at the bottom of the list.

Mr. Otis: What is corn stover?

Major Alvord: I refer to the corn plant cured dry, when the plant is forming its ear, when the ear is in the milk, cured under cover and as carefully husbanded as we would our best hay.

Mr. Swan: Cut when it is about three feet high?

Major Alvord: That depends on the corn; it may be three and it may be thirteen. Consequently, when we come to use these foods, we ought at least to recollect in which of these lists they stand high or low. For example, we find that our corn meal is very little less than concentrated hay, and when we add corn meal to ordinary mixed hay or timothy hay, it is simply adding so much hay in a concentrated farm. With our common hay we want to feed the nitrogenous principle in some of the forms of grain that furnish that material. With our ordinary hay, therefore, we should give cotton seed or gluten meal or wheat bran to balance our ration properly; and vice versa, when we are feeding clover hay, the richest of our dry forage in the nitrogenous principle, we often make a great mistake in feeding cotton seed meal or wheat bran, for we then want the grain food to be of the heat producing kind and corn meal would stand first. Corn meal should go with clover hay and cotton seed or wheat bran with the poorer classes of hay or corn stalks. It is useless to go into the detail of this because we have not only these matters laid down in our tables but also in Professor Stewart's book and in many of his contributions to the current literature of the day we have these rations made up for us--well-balanced rations as they are called—and very often such combinations as give us low priced articles, making a ration answering the purposes of our old-fashioned higher-priced hay and whole grain rations. For 800 or 1,000 pounds of live cow, we ought to give from twenty to twenty-five pounds of dry substance per day ; and taking our foods and fodder as a whole, we may expect that this will contain from twelve to sixteen pounds of digestible dry matter—two-thirds to three quarters or somewhere roughly in that neighborhood of our foods and fodders being in a digestible form. Then we would build up our ration according to this so as to secure the proper quantity of dry matter with the proper portion of it digestible and maintaining generally what we know as the nutritive ratio. It gives a great opportunity for variety in the food and is convenient as well as economical. I have not yet mentioned at all manurial value as being closely related to the feeding question, but in my opinion, it should never be forgotten ; and many times, the decision should be made between two foods equally valuable as food for our stock on the ground that the residue of one of them is much more valuable than that of the other as manure, that is, on the ground that the manure resulting in one case is much richer than in the other. As a practical example of the substitution of cheaper articles for the dearer, or of newer things for the old fashioned, I may give the substance of a letter I have recently received from a gentleman who had been feeding to his cows the following ration :

| | |
|---|---|
| 8 lbs. of Indian corn meal, worth | 9c. |
| 4 lbs. wheat middlings | 4c. |
| 12 lbs. English hay | 12c. |
| 6 lbs. Hungarian hay and for succulent food, in place of roots | 4½c. |
| 10 lbs. of apple pumice, worth | 1c. |
| Total worth of dairy ration | 30½c. |

" At that time " he writes : " I was feeding apple pumice quite sparingly, fearing it might injure my butter. My pumice cost me less than $1 a ton. After correspondence with you, I substituted the following ration :

| | | |
|---|---|---|
| 15 lbs. of Hungarian hay, | worth | 11¼c. |
| 30 lbs. of apple pumice, | " | 3c. |
| 6 lbs. gluten meal, | " | 7½c. |

This gluten meal brought in the nitrogen which had been lacking in his former ration, and his ration now cost twenty-one and three-fourths cents daily instead of thirty and one-half cents. He continues, "you said the ration was a little above the standard, and that I might reduce the hay a little. I had only one cow that would eat the fifteen pounds of it, and after a few days, I reduced it to ten pounds, making only eighteen cents as the cost of the ration at this time against my previous food which cost me thirty and one-half cents. Now for the results of the foods, all of the circumstances being the same. I was then milking four cows and the greatest amount of butter made in one week on the old ration was twenty-five pounds and six ounces. After using your ration one week, I made thirty-four pounds and thirteen ounces of what I considered better butter, and it continued up to a few ounces of that for weeks until I had other cows come into the dairy."

I merely give this as the testimony of a man who has made a practical experiment. I have visited the gentleman within a month and have been interested in his feeding during the present winter. I tasted his butter, found it to be a nice article, and I looked at his stock. He told me that on November 1st, he bought three dairy cows and one two year old heifer. The cows only were in milk and were quite thin in flesh, and the two year old was as poor as the cows. He paid eighteen dollars for the heifer, and she is to be sold about to-day—less than two months afterwards—for thirty-two dollars. The cows have also done remarkably well and two of them will go to the butcher within ten days and are now giving more milk than when he got them. To get these results his feed has been from forty to forty-three pounds of apple pumice, four quarts of cotton seed meal, and not over five to six pounds of oat hay, cut just in the milk, costing: Cotton seed meal, ten cents; oat hay, three cents; apple pumice, four cents, or seventeen cents a day.

He goes on to say that he finds from this trial that it is entirely possible for him to change from what a year or eighteen months ago he believed to be as economical a ration as he could make to one that costs less than two-thirds as much and to get equally satisfactory results.

Dr. Louis E. Sturtevant was next introduced. He said: Speaking after two such practical men as have already addressed you, I have concluded to keep, in the remarks I am about to make, very largely upon the scientific side, making, however, some connections with practical observations; and when I appeal to common sense and to observation, I trust that the experience of the gentlemen present will confirm the truth of my statements, for I do not wish to state anything doubtful and yet I may on a scientific point speak of some things which have not yet got into the papers and which I still believe to be true, because, when on the eve last year of leaving the New York Experimental Station, where I had been for six years previously, I very carefully reviewed all our feeding experiments with reference to this meeting, in order that I might draw from them the conclusions which were indicated and see if I could not formulate some principles which might be of advantage in the feeding of cattle. I have noticed in my own practical farming that when I have had occasion to change the man in the barn, there was always a change in the the product from the cows—either a gain or a loss—and so I made up my mind that, practically speaking, more depended upon the feeder in the barn than upon any rule of the feeding. Carrying this idea out in my own investigations, I found that there were some very curious things which I had not observed until I had placed myself in the position of watching cows whose food was not only weighed to them but also the refuse weighed back, so that I knew to an ounce how much had been consumed and also what effect that consumption had upon the system of the animal. I noticed with surprise this—that the cows would choose their own ration and oftentimes I would be unable to force cattle to eat the ration that I wished to experiment with, while I also found that the careful feeder who observed this habit of the cows in selecting their own ration could very easily pick out from that the ration which would be best for the cow. I could hardly understand this until some experimental work of this year showed me that when we came to apply this ration business which Major Alvord refers to as simply an empirical rule, apart from the good judgment of the feeder, it led to very discordant results. Where cattle have been fed very largely on highly nitrogenized substances, I observed that they would eat straw, but when they were fed on less highly nitrogenized foods, they would not touch straw, but required the best quality of hay. I also found that there were two systems of feeding which might be adopted—one, that of feeding simply for product without any regard to economy, and the other, that of feeding with reference to how to get the largest product at the least expense in the way of food—under these same circumstances of skill and judgment in the feeder who will be guided by the individuality of the cow and by the character of the food used as decided by the cow rather than by analysis. Then I came to the conclusion that the whole object of feeding is to get the animal to use all the food possible, that the profit comes from the cow consuming all the food that she can possibly digest while retaining her health, and that brought me to the point that I want to lay a little emphasis upon—that more depends upon the cow to secure product than upon the character of the food used. I have been able to detect no relation whatever between the composition of the butter—" composition," not " quality," the composition of butter being usually expressed in terms of chemical analysis—and the character of the food used. By increasing the nitrogenous portions of the food or by changing the nutritive ratio, we cannot carry the cow in production beyond the point which nature has determined for her. If you have ten pounds of butter with a cow and that is her maximum, by no change of food can you increase that by a single pound nor can you change the composition of that butter. But you can by injudicious feeding, or by not using proper care, diminish that product quite largely. Under this principle of feeding the cow according to the indications which she gives of the food herself, you will find that the more albuminoid material you get in the ration, the larger is the product until you reach this maximum for the animal; and with reference to economy, you want to give this nitrogenous matter combined in a proper relation with other foods, and you want to induce the cow to eat the largest possible quantity of the foods which you supply, and to do that, you will find there are some foods which may be placed as condimental, such as ensilage, the acid of the ensilage giving the cow an increased appetite, so that she will eat more food than she otherwise would. Turnips have the same peculiarity, so that when you are feeding a ration to the cow and add turnips to it, she eats more of the hay than she would have used without the turnips—in other words, the turnips are not economical in relation to the amount of food by replacing other food, but they act as a stimulant to the appetite of the cow so that the cow will eat more of the food with which you have supplied her in the form of hay or grain. Taking these statements as a skeleton, I will now go to some rather scientific points in relation to the composition of our ordinary foods and their relation to the animal. I stated, if you remember, that the larger the amount of nitrogenous food to the cow, the larger the product in a cow which is capable of assimilating and digesting that food. Now, this nitrogenous matter varies in the same material in different years and also with reference to the time that the food has been kept. For instance, to give one case which I will quote very nearly correctly, though I wish to use round figures, leaving out the fractions:—in 1886, grass cut in the bloom and made into hay, on analysis, was shown to contain four and one-half per cent. of nitrogen; while grass in 1887, cut from the same roots from the same spot and treated in like manner contained eight and one-half per cent. of albuminoid. So we had that great difference which you can see doubled in round numbers the value of the hay cut in the later year. In 1887, there was a small crop, on account of the drought of the season, and in 1886, quite a large crop; but we got more food value from our ground in 1887, with the small crop than the year before with an apparently large crop. Then this also must be remembered—that the larger the per cent. of albuminoid in a food, the larger per cent. of it is digestible. Where we have a small percentage of albuminoid, a large portion of it escapes digestion and is only valuable as it passes out in the excreta. But where you have a large percentage of albumnoid, a larger percentage is digested, and therefore as a matter of economy, the greater the percentage of albuminoid we can feed, the more profitable it is, provided we can unite it with other foods in the ration, in the way Major Alvord has so well presented to you. Now, if you feed these rations by rote, or simply according to the formula given, you will find that they will not produce identical results in any two years, or by being fed to any two different animals; and that carries us right back again to my former statement that more depended on the character of the feeder who will take his lessons from the cow than from any theoretical proposition we can lay down.

In regard to influencing the *quality* of our milk and of its products, we find that there is quite a difference between foods. We find that although the character of the food does not influence the composition of the butter yet it has a large influence on the quality of it;—and quality is not determined by chemists. We know but little even concerning the component parts of the butter fats which exist in our butter. But we find that the influence of the food has a striking effect upon the readiness with which butter is made and upon the economy of producing this butter for the market. Major Alvord's experiments confirm the results we have obtained at the New York Experimental Station in the same direction. In the feeding of animals we want to consider not only the question of economy or of quality, but also the object that we desire, whether it be milk or the manufacture of a low or of a high grade of butter. It merely requires knowledge on the part of the feeder or of the director of the feeder to produce whatever product may be considered the most desirable, and the markets of our own country and of the world are open to us. In using these foods, we must remember also that their composition changes with keeping. For instance, while the amount of albuminoid in hay two years old may be the same as in that of hay one year old or in bran, the composition may be the same in old and new bran, yet when you come to digestibility or to that portion of the chemical element which is assimilated by the animal, we there find that the food deteriorates through age, and that so far as we have made any trials—and we have made quite a number—the bran two years old is less efficacious and more of it must be given to the animal than of bran fresh from the mill to produce the same results. The same thing holds good with our hays so far as we have made an analysis. This whole question of feeding from the scientific point of view is an extremely complicated one, and so difficult is it from the practical point of view that I have never had under my control a first class feeder—that is, one who could get the best results both for product and for economy from the food which was at his disposition. That brings me again to endorse the remark that has been already made—that where we have not this first-class feeder, where we have not the definite knowledge as to the value of each ingredient of the food that we choose to use, then the next best thing is to feed on a system and to use our best judgment in adopting the rations which have been recommended by an average experience for this very purpose.

Mr. Burnett: Perhaps three experiments that I made last winter in the practical feeding of dairy cattle may interest you. Many of you are aware that I buy in the neighborhood of four tons of milk a day, and it is a very great object for me to have that milk of good quality. Last winter, therefore, I made three very careful experiments, taking three cows out of my own yard that made an average butter. I fed one on early cut clover hay about fifteen pounds, twenty pounds of yellow globe mangold wurzel, and ten pounds of corn meal—cob meal, as we call it—that is, the cob and the corn ground together, our New England cob meal. I fed this to the cow for thirty days. I took another cow giving the same quality of milk and about the same time from calving and I fed her on common English hay and fifteen pounds of a mixed grain composed of Western corn and shorts, half and half in bulk. I then took a third cow and fed her upon English hay and no roots and fifteen pounds of grain, dividing that up between shorts and glucose meal. The farmers in my part of the country are feeding a great deal of glucose meal. The result, at the end of thirty days was one of the most decided that I have ever seen. The cow that had my old fashioned feed that I swear by at home of clover hay and cob meal and roots produced a butter that I considered about as good as the Darlington butter, which I think stands at the head of the list. The cow that was fed on Western corn and shorts and good English hay produced a good butter but only fair--good but not remarkable. The cow that was fed on glucose and shorts and English hay produced a decidedly inferior butter, and its keeping qualities were such—I never could understand why --that it only lasted a few days. I have discovered from seventeen years of practical feeding that we cannot give too much importance to selecting the very best of everything for our dairy cows. And I tell you, gentlemen, that it will pay you to raise your own corn, because, during these last few years, while so much has been said and so many experiments have been tried with ensilage, we have developed in New England the wonderful qualities of corn stalks or corn fodder. Fodder corn and clover hay and old fashioned cob meal, I think, is one of the best rations in the world for breeding stock. To keep the animal in good condition, I supplement that food with roots. But you must remember that although the mangold wurzel has less than the turnip, that it still contains from eighty-eight to eighty-nine per cent. of water and it is really giving the cow slops to feed her as I do every day one-third of a bushel of mangold wurzel. But it keeps her in condition, brings her out in the spring with a good clean coat and I do it on a sanitary account more than for any other reason. I know from practical experience that shorts will supply the place of roots, and I think also—and I say this because I have been quoted all over the country as an enemy of ensilage—that from some experiments made near me that ensilage will do the same thing and that ensilage fed in moderate quantities is a very good fodder.

Mr. Rives: In the beginning of the evening, I referred to the presence of a triumvirate of experts, and we have indeed all been gratified by what they have said. It seems to me that no one can possibly read over the list of the New York Farmers without being struck with a triumvirate of the masters of the art of postprandial pyrotechnics. One of those masters is happily present with us—Brother Choate. He can tell us all about the law and the prophets, and having recently served with zeal a novitiate in the noble art of agriculture, we can hear from him with instruction and advantage, an account of the profits which have resulted from his operations on his Sabine Stockbridge farm.

Mr. Choate: Mr. Chairman, you have a very pleasant and seductive way of introducing both guests and members of the club. If there is anything that can put a man in sympathy with himself, it is one of your very fascinating introductions. I have observed the effect on the three gentlemen that have preceded me;—it seemed to give them the opinion that they know all about the subject they were called upon to discuss, and I do not know but what it will have the same effect on me before I get much further. My experience in the dairy business has been very brief, as you know ; I have only been a farmer for about six months and I have not got to the dignity of raising any cows yet. A little law calf is the best that I have been able to produce. I do not think the gentlemen that have spoken from a scientific and professional point of view have exhausted the subject that was assigned for this evening's discussion. A great many interesting facts, it seems to me, they have omitted, probably from their local and professional way of examining the matter. With a desire to make myself master of the true economics of the subject, which is the real object of our organization, I have taken the pains to invite letters from various members of the club and I have received several. I will not weary you by reading them but I can give you some hints which have been drawn from them and which may add a great deal to the wealth of learning that has been exhausted upon it. The first of these letters is from Mr. Havemeyer who has had a very large experience in the feeding of dairy cattle and he assures me that he has tried all the experiments which one after the other of these three learned experts have explained, and all with no success. He has tried ensilage and cob meal and corn stovers, mangold wurzel and all those other ingenious and very fallacious modes of feeding cattle and the more he fed his 140 head of Jerseys upon those worthless husks, the more profitless he found them ; and after exhausting the whole range of experiments he fell back upon home production and he has found from a very wide experience that the only real food upon which cattle can be sustained and made profitable is—sugar. He has tried all the other nitrogenous compounds and after several years' experience, he is satisfied that sugar is superior to them all, and he has found after consultation with Mr. John Meyer who has had the practical handling of the matter that by devoting the entire profit of a refinery in Brooklyn to the support of his dairy farm, he has been able to bring out his 140 Jerseys at the end of the year so as to make both ends meet.

There is no end to the very curious modes of sustaining cattle. I have had another letter from Mr. Appleton, the steward of this club, and if anyone could have a rich experience in the subject, I think it is he, and it is simply incredible—the results that he has produced and the sources from which he has worked them up. I can hardly believe it ; it sounds like something from the Arabian Nights. But he tells me that Waltham watches are the very best fodder. He says he tried on his farm at Ipswich all those experiments which Mr. Burnett and the Doctor and the Major have explained to us and he finds they are all entirely worthless, but when he came to turn in the entire results of the factory at Waltham, it exactly resulted in supporting the farm at Ipswich.

And then I got a letter signed by Col. Cannon and Mr. Burden. And what do you think their specific is for the article of food that will really compel Jerseys or any other cattle to yield the richest supply of milk and butter against their will? It is not grass, it is not clover, it is not roots, it is not ensilage ; it is simply a proper administration of pig iron. It was by a pure accident that they first discovered it. They had no idea of going into

Jersey cattle or any other sort of horned beast and they devoted themselves for many years to the raising of hogs in pigs and did it with very great success and suddenly it occurred to Mr. Cannon that by applying the same method to dairy cattle, it would probably succeed and the result has been marvelous. You have been up the river and you have seen those great works at Troy and wondered what was the final cause of their existence. You go to Burlington and you see it. On those green hills and broad meadows, you see the whole wealth of the Troy foundries poured out, and the result is marvelous. The number of pounds per week Mr. Burnett speaks of is nothing to what Col. Cannon has produced.

I supposed that had completed the examination which I was required to give to the subject until I received letters from Mr. Pierpont Morgan and Mr. Lanier and they said they had tried all that Havemeyer and Cannon and Burden and Appleton and the rest of the distinguished men in the club recommended but in vain and without success, and they found that the only true way of feeding cattle was to give them worthless husks, otherwise known as railroad bonds. That brought them out in the spring in splendid condition, but the milk they said was of the thinnest character and they could not for their lives imagine what the mysterious cause of this was until it occurred to them that those bonds were chiefly water. That gives an idea of a branch of the subject that has been very much neglected. The feeding of dairy cattle, the feeding of stock in my opinion—and I have had a very brief and limited experience of the matter—is of very limited importance compared with the watering of stock and if there is a subject on which the more prominent members of the Farmers are at home, it is this of the watering of stock. They are all around me; there is no doubt about it; I would like to know anyone except the poor lawyers here who is a member of the club that can lay his hand on his heart and say that on that branch of the subject—the watering of stock—he is not at home. Look up and down this table and you can find more gentlemen then you can count on the figures of both hands that are masters of the subject and I want to hear from some of them about it bye and bye—what the net results of watering stock compared with feeding stock are.

That leads me to another branch of the subject which it seems to me has been neglected in the development of the dairy industry and that is the remarkable art of separating the cream from the milk. I do not think Mr. Burnett and the Major know much about it—how to eliminate the cream and keep it for yourself and give the public the benefit of the skim milk. It always requires a syndicate to fully accomplish that, and I shall be very much disappointed if, following in the very crude suggestions that I have thrown out, we do not get some very wise ideas on the subject here to-night. I hope that all these gentlemen to whom I have referred in this modest way and who have spoken indirectly through me will be called on by you, Mr. President, in virtue of the authority of your office to speak for themselves and I assure you that if they tell all they know, we shall go home wiser and better and possibly richer men than we came here.

Mr. Jay: I would like to ask in regard to a side matter in reference to the feeding of stock, of which I have been reminded by a recent paper before the university of Wisconsin about an experiment that took place at the Agricultural Experiment Station at that university. It is stated there that Wisconsin is largely interested in swine; that the annual product of swine in that State is $10,000,000; that the swine have been extremely well bred—so well bred that they have become very delicate and their bones are soft and they do not prove to be good mothers, and some anxiety has been felt in regard to their health; that the first proposition was "let us go back to the old style hog, which was of a wonderfully hardy and vigorous nature and renew the breed in that way," and that another gentleman said "no, let us preserve the improvement we have got and see if we cannot recover their constitutions by appropriate food," and this experiment was the result of the last suggestion. The swine had been generally fed on corn, which as we have been told by Mr. Alvard, produces heat and fat, and it occurred to this gentleman at once that the only way to restore the healthy character of the muscles and bones of the animal was to introduce a food more abounding in protein and ash, and the experiment was conducted on that theory. The result of it is summed up at the conclusion—"we do not want less corn but we want more clover, more shorts, bran, peas, skim milk to bring out the higher results"—and I think he also mentions dried beef blood.

Mr. Burnett: I can say a few words about the pigs that I have seen during the last seven or eight years at the large western state fairs. I have seen them develop, as Mr. Jay says, into a beautifully bred pig—one with as little bone and as much fat as possible. The trouble comes from too much in-breeding in most cases. It is a curious fact, as you all know, that the pig originally was a grazer. The pigs of the last century were about half snout and half body, and to-day you may take one of our most improved type of pigs, which would probably be the small Yorkshire, and in three generations you can lengthen its snout three times and you can get that result by simply turning it out in the woods to graze. These western farmers have bred in and have fed too much fat producing food and not enough muscle and bone making material. They have not fed any of the phosphates, and the result now desired can be obtained by feeding shorts and by turning the pigs out. Very few people realize the importance of clover. I have seen most splendid results obtained by taking spring pigs as soon as they were weaned and turning them into a clover field and letting them run from the first or middle of June until the first of September, then housing them for thirty days and feeding them on whole corn and corn meal. At the end of six months I have seen a litter of nineteen pigs average 200 pounds. That for an average result was wonderful. 319 was the best and 171 was the smallest pig in the litter. In breeding pigs, I do not think that many men can afford to breed thoroughbreds. They are an animal that runs out very quickly if bred too closely and my advice to all the farmers that supply me in Western and Northern Massachusetts and in New Hampshire is "breed from the finest boars; get for your male the most perfect type of the animal you can find; when you cross that male, get something that has constitution and that is rather coarse; take sows that have a long, large body—rather a coarse sow." The result of this crossing with a fine thoroughbred boar will produce pigs of good constitution and the best possible results for the ordinary farmer.

Mr. Meyer: I did not expect to be called upon this evening to give you the outline of our working at Mountain Side with ensilage, although I am very glad to be able to do so, if it interests you. About six years ago, Mr. Havemeyer suggested our going down to one of our neighbors in New Jersey and looking at his silos. I was very much against ensilage at the time from what I had seen of the feeding and the results, but Mr. Havemeyer was very much bent upon trying it, and so we built our silos in such a way that if they proved unsuccessful, they could be turned into a barn, while, of course, if successful, we should continue the feeding of ensilage.

We filled our silos the first year with corn cut before it was in the milk. In the middle of the winter we commenced feeding it with half the quantity of grain that we had fed with our dry fodder the year before. It increased the flow of our milk one-third, giving us about six per cent. more cream. We fed then four pounds of corn meal and one pound of ground oats and two of bran. The second year, I put in the same ensilage and kept that for three years. I went to Europe and came back in the Fall and I opened the silo that was filled three years before. Where I had fed forty pounds of the ensilage one year old, I fed of the three year old only twenty pounds—just one-half—which gave me the same results, and proved that the longer we kept it, the more nutritious it was. I have now a silo that has been in seven years, and I expect to open that next week and I shall send the results of that feeding as soon as I make the tests to the State Board of New Jersey. It was Dr. Agnew who suggested to me to keep the ensilage as long as I possibly could. So far, since we have fed it, we have had not nearly so much trouble with our cattle or calves as when we fed dry fodder. Our calves get it when they are about seven weeks old—from five pounds to eight pounds a day. Feeding the allowance of grain and ensilage that we feed, it costs us to raise a yearling heifer $23. For our feeding of our cattle as we are feeding them now—eight pounds of corn meal, four pounds of ground oats and two quarts of bran with thirty pounds of ensilage, fifteen pounds in the morning and fifteen pounds at night, and five pounds of hay—$63 a year. The average butter from our cows, taking our herd of 100 we calculate in the eight or nine months that we are milking, at 250 pounds of butter to the herd, two years old and up. The percentage of cream the day before yesterday was twenty-eight per cent. with the feeding I have given.

Mr. Burnett: That is in the deep setting?

Mr. Meyer: That is in the deep setting, yes. Our regular feed in the morning is fifteen pounds of ensilage to the cows, with three and one-half pounds of corn meal and two pounds of oats and one of bran. We divide the feed into three feeds, costing us for the grain fourteen cents a day. The ensilage last year with everything included—the seed, the manure, the fertilizer, tilling the soil, the engineer's time, the coal, and even the feed for the horse while they were harrowing it in—cost us exactly ninety-nine cents a ton, though Mr. Havemeyer said I ought to call it a dollar. And with our tests there, two tons of ensilage give us the same results as one ton of the best clover hay.

Mr. Otis: What is the yield per acre of ensilage?

Mr. Meyer: Thirty-three tons to the acre.

Mr. Otis: And the best yield of hay?

Mr. Meyer: Two and three-quarter tons to the acre.

Mr. Burnett; I would like to ask Mr. Meyer if he can tell from the disposition of his product about how much milk it takes to make a pound of butter?

Mr. Meyer: It takes in our herd on an average fourteen and one-half pounds of milk to make a pound of butter. We keep an exact account of every cow every day. That is put in the milk book in the barn where I am always at each milking, and that is carried into a monthly and a yearly book. At the end of the year we know exactly what the cow has given. During Mr. Havermeyer's absence in Europe, I sold the herd in June, and at the sale I gave the milking of the herd for the two years previous, and I have since been told by some of the buyers that the cows have not only equalled but have exceeded what I gave them. That resulted, of course, from my careful account of the milk. It has been a great hobby with me to keep the accounts of the milk and the feed and the whole establishment. I have taken pride in running things as closely as I could and still obtain proper results.

Mr. Bronson: We have seen in the papers that ensilage has been better thought of than it was a few years ago. I think ensilage is a great mistake and yet I should like Dr. Sturtevant to give us some of his recent experiments with it.

Mr. Sturtevant; I have been very much interested in this subject of ensilage and I commenced the study of it under the imputation of being an enemy to it. But I think that we can accept it as a fact that ensilage has come to stay. When, however, we come to the method of feeding ensilage so as to get the best results, I think that matter is not yet settled and that it is probably very largely a matter of opinion at the present time. One interesting thing in regard to ensilage is how we can put it up in the cheapest form, because if we attempt to put it up as was at first recommended, the expense on an ordinary farm becomes too great to allow of its competing with dry fodder. In putting it up, the principle seems to be to exclude air and to carry the temperature sufficiently high to destroy the bacteria germs. Year before last, I tried putting up ensilage without any pressure. It was cut at the rate of one and a-half feet a day and put in the silo, which became too hot to bear the hand in. When the silo was filled, some planks were placed loosely on top to keep the dust off, but not to give pressure, and it was left so. When we came to use that ensilage, we found it was better in quality than any we had put up at the station before; it was a perfect success. Last year, the same experiment was repeated and the results, though not quite as good, were fully up to the average results last year of that which we put up under the most complete methods. So that I think we can say that by filling the silo slowly and allowing each layer to get thoroughly hot before adding another, we can keep our ensilage without pressure, the upper layers furnishing sufficient pressure to exclude the air, while putting it in slowly keeps in the heat and prevents it getting too acid or decaying.

In England, the idea occurred to them to "why not stack ensilage the same as hay and bring an artificial pressure to bear on it?" That had been reported upon very favorably and last year a set of chains and some machinery for compressing were imported, and we built a stack fourteen feet square and eight feet high of grass—alfalfa or lucerne, which is very nutritious and very difficult to keep, Hungarian grass and the common refuse after-math—whatever we could find. But in a few hours after applying the pressure, we found that the chains confining the beams were loose, and that proved to us that the compressing machinery was unnecessary and that the weight of the material itself was enough to compress it. I examined this stack on October first and found it in excellent condition—indeed the only sweet ensilage I have ever seen. It had absolutely no trace of acid to the smell. Since then it has not been opened, but my successor will open and report upon it on the 27th of January. Of course, it may have spoiled since October. We observed also in regard to it on October 1st that the heat of the interior and the exposure of the sides to the air had dried the outside surface so that it appeared like a stack of hay and you had to go in three or four inches before you struck the ensilage. That I consider one of the most interesting experiments that have been made in regard to ensilage. It is as yet undecided whether this method is a practical success, but if it proves so we shall save the expense of the silo and simply stack it up in the open air, taking care chiefly to stack it leisurely enough to allow each layer to become thoroughly hot before the next layer is applied. I have my own opinions about the value of ensilage but I do not want to lay too much stress upon them, because I have not experimented on a sufficiently extended scale. My impression is that ensilage acts in the first place as a condimentary food and improves the appetite of the animal so that its eats more and digests better, and that therefore in limited quantities it has value, other than its value as an economical food. Where we have fed it—fourteen pounds a day with the ordinary farmer's rations—it has done well, but when fed in excess of that, it has been at the end of a few months extremely injurious. I think that it is very probable that when, as Mr. Meyer states, you increase the grain ration with it so as to balance the ration, it may be fed safely in far larger quantities than we have yet used at the station.

Mr. Burden: Has the feeding of the ensilage affected the state of the milk?

Mr. Sturtevant: That is a very difficult question to answer, because the milk can take flavor so readily by exposure to an atmosphere which is filled with ensilage fumes. As near as I can make out, the ensilage flavor that you find often comes from the atmosphere of the barn and not from the animal.

Mr. Burnett: In stacking this ensilage, did you put anything on top of it?

Mr. Sturtevant: We simply laid some beams across and attached the chains.

Mr. Burnett: I was in England in November and visited the Aylesbury Dairy Company. They were just opening a stack that had been stacked for twelve or thirteen months, and they had put straw on the top of it to the depth of about four feet and then the chains were bound over the straw, which prevented them cutting the ensilage. But they take up the slack every day or two.

Mr. Havemeyer: Did I understand Mr. Sturtevant to say that he fed his cattle once a day only with ensilage?

Mr. Sturtevant: Only one feed with the ensilage. I was going to say that when I was in practical farming, I was formerly feeding my cows five times a day—practically continuous feeding, keeping a man there to crowd the animals. About that time, Mr. Ellsworth announced his experience in feeding twice a day only, and while I was extremely prejudiced against it, I accepted the force of his arguments and changed my method of feeding from five to two times a day. I have always been in the habit of keeping a milk record, every milking being weighed, so that I know what each cow has done at any period, and I have those records now, which extend over twelve years or more. To our great surprise, following the change from feeding five to two times a day, the milk increased in quantity and the cattle improved in weight. The argument for the smaller number of times is that cattle in pasture fill their paunch and then lie down and rest, and in feeding too often, you interfere with that rumination. Whether the argument is true or not, I cannot determine, but as a matter of fact, the live weight of our cattle increased and the milk yield increased by the change.

Mr. Burden: Do you consider ensilage a healthy food for cattle?

Mr. Sturtevant: When fed in limited quantity up to fourteen pounds a day with the ordinary rations we have been using, I consider it an extremely healthy food because it has condimental action. When fed beyond that with the ordinary farm rations I found it detrimental, but I think that by adding nitrogen to it—increasing the corn or using cotton seed meal or gluten—it might not be injurious even when fed in double or treble that quantity. I know some herds that have been fed for years very heavily on ensilage and are in perfect health.

Mr. Bronson: Can you explain why it is not fit for horses?

Mr. Sturtevant: I cannot; I think it is a fact, though?

Mr. Bronson: You speak of cotton seed meal; is not that in large quantities a dangerous food?

Mr. Sturtevant: It requires a most judicious feeder. It is the only food from which I have had cattle die in the barn.

Mr. Bronson: What ration do you give?

Mr. Sturtevant: My rule was when I did not go into the barn myself never to exceed two quarts to a cow a day, and yet if I went into the barn myself, I would dare give double that, and there are cows to which you can feed half a bushel. But when you deal with an ordinary feeder, you have got to go on averages. I think it is a dangerous food. I have no experience in butter making and I might question whether it is wise food even for butter making, but for milk making it stands ahead. It seems to have a tendency to stimulate the milk glands in excess of any food I have ever tried.

The " Farmers" then adjourned.

# The

# "New York Farmers"

MET again at the Cafe Savarin, Equitable Building, on February 16th, 1888. Mr. John Jay, in opening the proceedings, said:

In taking this position and assuming the duties of the chair this evening, I cannot forbear from expressing, although even in a simple word, our deep and tender sympathy with our president in the great sorrow that has overtaken him. It is a sympathy which we share with a large social circle that mourns the loss of one that is most prominent in its numbers. I am sure that Mr. Rives will accept as kindly as it is offered this tribute from his associates, the New York Farmers, with whom his official duties and his charming personal characteristics have established relations of warm companionship and regard. In assuming the duties of the place and pursuing the duties which Mr. Rives had commenced of securing experts for our discussion to-night, upon the subject of the evening, "The Feeding and Breeding of Swine," I was kindly assisted by Mr. Otis and Mr. Bronson, to whom I beg leave cordially to return my thanks. We were successful in securing favorable replies from our associates, Dr. Borland, and from Mr. Bowditch, of Framingham, Massachusetts. We had also a favorable response from Mr. Joseph Harris, of a farm near Rochester, the author of the clever treatise on pigs, which some of us have in an illustrated edition, but to our regret I received this evening just before I came here a note from Mr. Harris expressing his profound regret that at the last moment he was compelled to deny himself the pleasure of coming.

The subject of discussion to-night is one of no slight importance, considered financially. I believe that the total value of the swine in this country is estimated at upwards of two hundred millions, and, in reference to Kansas, it is stated in a recent report from Washington that Kansas has not yet recovered from the effects a few years since of the hog cholera. The discussions of this club, owing in great part to the clever management of our president in securing admirable experts on each occasion, have furnished a volume the importance and value of which is recognized. I was told the other day by Col. Cannon that some of his English friends to whom he had sent out proceedings had expressed their pleasure and surprise that Americans were in advance even of English agriculturists in the art of high farming.

Although deprived of the pleasure of the presence of Mr. Harris, we are amply supplied for the discussions of the evening, and I think these discussions, both in the importance of the subject and in the ability of the experts, will add to the value of our forthcoming banquet.

I might also add here that we are favored with the presence as a guest of Mr. Samuel Borrowe, to whose courtesy we are indebted for our entertainment to-night in these beautiful club parlors. I have now the pleasure of introducing Dr. Borland, our associate, who will commence the discussion.

Mr. J. Nelson Borland; Mr. President and Gentlemen: I do not propose to place myself before you as an expert, and as reading a paper is much more easy to a person who is unaccustomed to public speaking than making a speech, I will, with your permission, read a few remarks which I have prepared. When I was asked to talk to you to-night on the pig, I at first felt rather confounded with the magnitude of the subject, and as the opportunity of saying so much was so great, it was difficult to know just how to manage it. When we realize that this great country is the leading pig breeding country of the world,—more than that—that in America we own and breed almost as many swine in numbers as all the rest of the pork producing nations of the world, and valued at more than one-half in actual money, we see that the subject is certainly a great one, but when the notice of our dinner was received from our steward, I was glad to see that the subject was defined as the "Breeding and Feeding of Swine," and this I think we may again limit to the breeding and feeding of such swine as may be best for us, members of this club, to keep upon our own places.

I presume that most of the gentlemen here present have travelled in the West, and have realized that in that section of the country the large portion of the pigs they have passed in the stock cars, going to Chicago or Omaha, or to Kansas City, were a large, coarse, heavy, snouty black colored pig, the Poland China, valued by Western breeders for hardy constitutions, prolificacy, and in Western term "ability to rustle." This type, fitted for the Western plains, is not one that we should be apt to select.

But what will suit us better and be of more value to us, and to our neighbor farmers, is some sort of the thoroughbred pig. Which variety, each person has to decide for himself, and be governed by his surroundings, and the sort of land he owns.

The modern thoroughbred pig is divided into two great families—the white and black varieties.

The white variety consists of the large and the small Yorkshires, and also in England they recognize a strain of Middle Yorkshires, intermediate in size between the other two. In our American Small Yorkshire Club, the Middle Yorkshire is admitted to registry, equally with the small Yorkshire, the large Yorkshire being excluded, this latter animal being coarse, and very large. He is slower in developing than the smaller sort, and at ten months old is apt to weigh less, but continuing to grow reaches a great size when two to three years old, frequently weighing from eleven hundred to twelve hundred pounds. The middle white Yorkshire, has been obtained by crossing boars of the small strain upon sows of the large coarse variety, with possibly a cross of the English Cumberland. They have the points of the small breed, the short nose, upright ear, flesh put on where it should be, bone small and offal reduced to a minimum, and will weigh two hundred and fifty pounds at ten months old and up to three hundred and seventy-five to four hundred pounds at fifteen months old.

The small Yorkshire has a head short and small cheeks, full and prominent, small upright ears, a short thick neck, wide deep chest, thick shoulders, well arched ribs, long between shoulders and hams, a broad level straight back, well filled out hams, short legs, fine silky hair, which hair should be pale yellowish white. These strictly small pigs should weigh one hundred and seventy pounds at ten months old, to two hundred and eighty at fifteen months.

There is another variety of white pig, which is an American bred animal, the Chester County white, a large rangy pig, with a large ear, dropping forward; it is a valuable animal, but not one calculated to improve the common pig; it has not the prepotency so marked in the Yorkshire variety and does not fatten on so small a ration of food.

In the black variety of pig the leading family is the Berkshire, a breed corresponding in size to the Middle Yorkshire. It is black with white on the nose, tip of tail, and all four feet, a vigorous healthy pig, prolific, hardy constitution, making the most excellent quality of pork and bacon. They have many admirers in this country, and a large association of breeders. The boars are now very frequently used in the Western herds upon the black Poland China sows, to improve the quality of the stock.

This breed of swine is the chief of the black thoroughbreds, the smaller sorts, as Essex, Dorset, and the like, being less frequently met with.

With this brief sketch of the prominent strains of thoroughbred pigs, I will revert to what I said before, that each one of us has to be governed by his own taste or fancy in his choice of variety, by the sort of land he has to manage and by the preferences of his neighbors.

In my own case, I selected for my own stock the pigs of the small Yorkshire, endeavoring to maintain the Middle Yorkshire type. My principal boar was farrowed November 1, 1885, being now about twenty-seven months old, and weighing four hundred pounds; and my sows are good-sized, well developed animals. I prefer this breed because: First, they are so thoroughbred, and this is shown by the power of the boars to reproduce their own type, even as to color when bred to black sows. Second, their gentle temper and home keeping habits. My breeding sows I turn out into a small orchard, from as soon as weather permits, say in June, and there they stay till the cold weather and frozen ground in Autumn, unless taken up into a breeding pen a few days before littering. From this orchard I have never had one stray out, although they have had chances enough. Third, their easy keeping and the minimum of food they require, in fact, the difficulty one meets with in managing the breeding stock, is to not overfeed. These thoroughbreds I keep to sell—the young—for breeders.

Also I keep about half a dozen of the best specimens of Chester white sows, large, roomy, long, and as well bred as I could get. These I mate with the Yorkshire boars and have large litters of large pigs, that grow rapidly, fatten easily. These pigs I breed to sell to the farmers about me, and they have found the profit of raising a sort that fattens so easily on a minimum of food, and I find it difficult to raise enough to supply the demand.

Another reason for selecting the Yorkshire, is that in my neighborhood, there is a marked preference for the white over the black pig, the former being far more salable.

However we may decide as to the variety of pig which we may choose to breed, there are certain rules applicable to all which should govern us in the selection of our individuals.

Firstly, the fact should never be forgotten, that in the boar, we have the most important individual of the herd. The fact that the boar is half the herd is fully as true as in cattle breeding, the bull is half the herd. Too much pains cannot be taken to get the very best. We should want him absolutely thoroughbred in his pedigree. His ancestry should be of first rate thoroughbreds, free from any glaring defects and with as many good points as possible.

He should be one of a good-sized, and even litter of pigs; this is important, as it is so easy to perpetuate a great breeding fault, that of having three or four little unprofitable runts in each litter. Most sows have one small and valueless pig in each litter, especially if it is a large one, but that is very different from having a number of them.

Then the individual himself should possess a certain conformation: a short dished face, and a broad jowl, fine muzzle, fine ears, generally erect, a short thick neck, wide shoulders and chest, well arched ribs, a strong broad loin, deep flanks, full hams, short legs, standing well apart. He should be squarely built and covered with a rather plentiful coat of soft fine hair. He should be lively, vigorous, gentle in temper. These should be the general characteristics of any boar you use in your herd, and another point should be borne in mind, that it is generally conceded now by breeders that it is to the boar that the external appearance, the frame work of the young, is due. To the sow the internal structures.

Having selected the boar, the next is the choice of the sows with which to mate him. Of course they should be thoroughbred and show as markedly as possible the points of their breed. But they can be a little coarser than the boar, for their offspring will show his refining influence. They should be rather loosely built, rangy, with the same general characteristics of head, loin, shoulder, and hams, a big girth back of the shoulders, square upright position in standing, a good quality of hair, and what is very important, a good supply of teats, twelve of them. Such sows should be chosen from an even litter of pigs, and of a descent that is known to be of a good tempered family, that have been good mothers, for this quality is distinctly hereditary, and with your breeding stock thus chosen, and carefully selected you have every reason to expect more than fair, excellent results in your breeding.

We now come to the second part of our subject for the evening's consideration ; the feeding of the herd.

Two things should be borne in mind prominently :

*First.* That the pig is a grass feeding animal.

*Second.* That corn in the American sense or Indian corn is a fat producer of the first quality, and I make this point because we are apt to use it too freely in our feed, and it ought to be kept in reserve for the food during the actual process of fattening the pig for slaughter. The boar we should endeavor to keep in a condition of vigorous health, avoiding having him too fat, which makes him sluggish and interferes with his procreative powers. The amount of grain we give we should govern by the amount of his service.

In my own feeding, I am using in about the following proportions:

| | | |
|---|---|---|
| Bran or wheat middlings | 5 | pounds. |
| Ground oats | 2 | " |
| Ground linseed | 2 | " |
| Gluten meal | 1 | " |

This is mixed with a bushel of cut roots, golden tankard beets, carrots or when I have them, potatoes and turnips, with about a pound of chopped hay or dried oat or peas hay. This is all steamed until thoroughly cooked, and is my winter feed. In the summer time the place of the steamed hay and roots is supplied by grass and with this feeding the animals are kept healthy and hearty, and the muscle and bone are kept in their properly nourished state, without an undue excess of fat.

The sows I feed on this same food, which I should have said, is always salted a little ; when the sows are suckling their young I add to the grain about half a pound of cobmeal, which can be scalded separately and added to their individual mess.

Ensilage is said to be a capital food in place of the steamed roots or hay, but I never have had any experience with it.

Swill or kitchen offal is used by many as a cheap form of nutritious food, and it serves an excellent purpose. It is a mooted point as to whether it should be steamed or not. My own preference is for steaming, but one of our best breeders is opposed to it, thinking his herd has been more healthy without steaming ; another has only had sickness in those who have had raw swill. With this form of food, a rather smaller quantity of the grain food is required.

The manner of feeding for fattening for the butcher is where the value of our corn feeding is shown. About three months before the pig is to be slaughtered a portion of the above described food is withdrawn and corn, either as grain or meal, is substituted and this is gradually increased in amount until about three weeks before killing, the proportion of grain is three of corn to one of the other food. This gives all the fat we want and hardens it so that the pig is in the best shape when killed.

When the young pigs are about three weeks old we put in the pen a shallow trough in which we put a little sweet milk, and give them as much as they will drink, no more. This is done two or three times daily. After a few days it is thickened with a little wheat middlings, and gradually this is increased so that at six or seven weeks they are feeding freely, and if it is desired they can then be weaned without any check to their growth, and brought on to the food of the other ones.

The matter of steaming the food is not at all a difficult one. I have in my pig house, at one end, a Purinton steam boiler. A pipe from this is conducted to the bottom of a cask containing the food mixed to be cooked. The cask is covered at the top, and the mess is done in about three-quarters of an hour. From the boiler I have a set of pipes conducted the length of the house about seven feet above the floor and over the pens, and in very severe weather I use the steam for the warmth, and with this arrangement I can have my sows pig without any loss or injury to the young, while before I had it I have had the misfortune to lose whole litters of the new born pigs from freezing.

Besides, the mere supply of the right sort of food, we should not forget that, as I said before, the pig is a grass feeder, and if it is possible so to arrange it the pens or styes should have, in addition to the ordinary yard, a strip of grass land in which each pig can exercise and root, and pick his grasses, and if he has not grass enough for his food then cut grass, weeds, etc., can be thrown in daily. A paddock or meadow near the pig house will accommodate many of the sows and young pigs. The boar should not be allowed to roam at will amongst these, he should have his own separate and distinct apartment and exercising ground, and the sows when in heat should be turned in with him.

Before I close I should like to caution breeders about the necessity of a close inspection of the sows before they farrow, to be sure that they are not constipated. Constipation at this time is a source of trouble easily avoided. They, under its influence, are feverish and in their pain they are apt to kill their pigs, either by biting them, or in their restlessness throw themselves about, and on, their young. If any sign of costiveness show itself a tablespoonful of sulphur in their food will regulate them, and they should be supplied with plenty of clean water to drink, and for two or three days after the birth of the young the sows should be kept on cooling eating diet, with plenty of drinking water besides.

We also should bear in mind that our pig houses should be kept clean. Their drinking places should be clean. The pig is by nature a clean animal. He does not want, need nor enjoy filth. Keep them clean, give them clean food and plenty of clean water, with dry clean bedding and they will be far more profitable and infinitely more pleasure to the keeper and breeder.

Mr. E. F. Bowditch : I knew that Doctor Borland would say all that could be said on the subject. But if you will allow me, I looked up some figures which surprised me so much that I desire to place them before you as I am quite certain they will interest you. Doctor Borland has covered the ground so fully about feeding, etc., that perhaps a little in relation to the history of the pig will not be out of place.

The origin of the pig has been often disputed, but Darwin states that the Chinese claim to have kept the pig as a domestic animal for 4,900 years. The wild hog does not get its growth till four or five years old, and lives to be twenty-five or thirty years of age. Sows breed but once a year, littering only five or six pigs. The sow suckles her young about four months, but keeps her family with her for ten months, or till they can thoroughly protect themselves. The old English hog, as well as the Irish, according to pictures resemble the wild hog in looks, but the best authorities are inclined to believe they are descended from the more ancient domestic breeds. The pigs of eighty or a hundred years ago shrunk when killed about eighty per cent. The best breeds of to-day shrink less than twenty-five per cent. Lawes and Gilbert dissected a Yorkshire pig a few years ago which weighed alive 640 pounds, the bones weighing only twenty-one pounds.

The magnitude of the hog interest is hardly dreamed of until the figures are consulted. In 1882 the Commissioner of Agriculture gave the number of hogs in the United States as about 44,000,000, including pigs of an average value of $5.98; making the value $263,543.195, the highest average being in Massachusetts, $15.30, the lowest in Arkansas, $3. The value of hogs packed in 1884 was $55,818,711. If these same hogs had been well bred and well fed they would probably have weighed 100 pounds more each, which at four cents per pound would have amounted to $19,129,612,—which the farmers of the United States lost by not having good breeds.

Mr. Cannon: They want the New York Farmers to guide them.

Mr. E. F. Bowditch: Vaubran calculated the produce of one sow, raising two litters a year and all allowed to live and breed for eleven years, to be about 6,000,000.

Mr. Lanier: That beats the rabbits in Australia all to death.

Mr. E. F. Bowditch: It merely shows you that there is no danger of exterminating the breed by the killing we do. The hog, according to Limaens, is naturally a very clean vegetable feeder, and particular, as it rejects 172 plants and eats seventy-two, while a cow and horse respectively reject 218, 212, eating 276 and 262. Many breeds were in existence forty odd years ago. The Royal Society in 1841 offered prizes only for the best boars, sows and young pigs. In 1843 the Royal Society offered prizes for large and small breeds. In 1863 a discussion came up about recognizing three sizes. In 1864 they offered prizes for the large and small white, Berkshire, small, black, and other breeds, which meant middle. In 1882 they recognized the large, middle and small white, and the small black. In 1884 they recognized the large, middle and small white, and the small black, and another prize was offered for other breeds, which meant the Tamwurth. In 1885 the Tamwurths were recognized besides these, and prizes were offered for all six breeds. In 1887 the prizes offered were for the three whites, Berkshire, Tamwurth, and other black breeds.

That covers the few items that I thought would interest you, beyond what Doctor Borland has mentioned.

Mr. Cannon: I must plead to profound ignorance about the breeding and feeding of pigs, although I recollect that some thirty years ago I spent a good part of a summer in feeding two pigs, not through the agency of any servant or keeper, for I did it myself, and perhaps a relation of that experience and that summer's work may be of profit. It was the first year I went into the State of Vermont. I took a furnished house, and the neighbors around me were very kind, suggesting that I wanted this and that, and finally they asked me if I did not want some pigs. I said "No, what on earth do I want of pigs?" "Why, to eat up your swill," they said. "No," I said, "I will throw it away." "Where will you throw it," they next asked. Then I was stuck. So I told the butcher to buy me a pig; "on the whole," I told him, "you had better buy two pigs," for I thought one fellow would be lonesome without company. Well, the pigs were bought, and a sty was knocked up back of the stable. After a while I looked into the sty, and I became interested in the pigs. I thought it was a disagreeable sort of an animal, and I began to experience the feeling of a respectable Israelite in regard to pork. I began to be curious to ascertain how much those fellows would eat. So I sent them off and had them weighed. I got their exact weight, and then I told the servants to let them alone, that I proposed to feed them myself. I got the best suggestions I could in regard to their diet, and I fed those pigs, to see what I could do. After about four months' laborious duty I got one fellow so he could barely get up on his fore legs and screw himself around, no evidence of eyes, and, as I had to leave then,—I would have fetched the other fellow if they had given me a fortnight longer,—and so I sold them. I kept an accurate account of the cost of the pigs and the feed. I got $23.75 for them, and the food that I put into them cost me about $35, so that my experience in regard to the feeding and breeding of pigs has been carried out in about everything else that I have ever attempted to raise. I recollect meeting a fellow once down in Kentucky, who told me a story about pigs. There was a very enterprising fellow out there who hadn't any means of any consequence, but he was very fond of pigs, and he used to collect droves of them and drive them into Louisville, until finally he was such a success at the business that he got to be the principal hog merchant in the community. After a while he concluded to try a bigger market, and so he concluded to go to New Orleans with a large quantity of hogs. One of his friends said to him: "Sam, you had better keep away from that town, I have been there; its a very expensive place." However, he was very confident, and so he built a big flat boat and loaded it with hogs and floated down the river to New Orleans. His absence was so prolonged that after a while his friends began to think he had emigrated for good. Then they heard he was working his way back as a deck hand. When he got home his friend met him and said: "Sam, did you save yourself?" "Yes," says he, "I saved myself, but I lost my hogs." But Mr. President, it may be remembered that I made a hasty retreat at our last dinner. I confess I was not a little shocked at the freedom—and I may say at the violation of confidence—with which private communications had been treated by one of our farmers, Mr. Choate. Mr. Choate solicited a certain amount of information in regard to feeding a dairy cow. I suppose he excuses himself that he betrayed that in the confidence of the dinner table. Now, while he told us about these gentlemen who had made these discoveries in regard to certain economy, such as Mr. Havemeyer, who thinks sugar is the only thing, and Mr. Appleton, who believes that watches is the best diet, and Mr. Lanier and Mr. Morgan, who think that stocks and bonds are, and Mr. Burden who believes in pig iron, he didn't treat this matter with entire frankness. At the time he solicited that kind of information he was just as prepared to give his own experience. I am not at all surprised that he didn't give it. Mr. Choate is one of the most genial men, one of the most sympathetic men to be found anywhere in the country, yet inherits that admirable and aggressive spirit of New England, particularly of Massachusetts, and whenever success is to be attained there is nothing on the face of the earth that stops him, and, true to his inheritance, he had failed with all substitutes of diet, as the rest of us have, and, gentlemen, he confessed to one of the most inhuman resorts known to make success,—he confessed to the fact that he has been feeding his herd on his clients, not until after he had skinned them, however. Furthermore, too, you will recollect that he had not a few criticisms to make upon the gentlemen that were making and selling milk, and particularly with reference to the centrifugal process,—that what the people got was the poorest kind of milk. Now, Mr. President, it suggested itself to my mind that possibly—because it has been the usage in this body—that some one of our junior farmers should be appointed as steward, and some of these stewards have taken a very great liberty, which has really made our dinners a very great departure from the quite frugal repast that the farmers intended should be enjoyed here. They have given us a magnificent menu, they have decorated our tables with flowers, etc., until it has become not only a very magnificent entertainment but something that is rather out of the line of the horny-handed sons of toil. But with reference to Mr. Choate I suggest that our by-laws be amended if he is ever to be appointed as steward and an absolute prohibition be imposed upon any one of the stewards furnishing any product of their farm, for he may possibly give us some of his milk, and if he does it will carry so much animal heat that it may be somewhat dangerous. I only regret that our friend Choate is not here now, for he betrayed secrets here which all of us—at least, he satisfied us all I think that farming with the New York Farmers is a luxury.

The Chairman ; I am sorry Mr. Choate felt obliged to retire, for we should all have been delighted to hear from him this evening. I was in hopes that we might be favored with the presence of our friend, Mr. Depew. We all know that his engagements are many, perhaps greater than any we have ourselves, and perhaps his correspondence has not been lessened by recent advices from Europe. But I don't think it was on that account or of any hesitation on his part to discuss the question of the feeding and breeding of swine that he is absent to-night, for I have a note from him which says; "I sincerely regret that an engagement made months ago will prevent my being present on the last of these delightful and memorable gatherings." I venture under these circumstances to call upon a gentleman who, although his business has not been especially connected with the feeding and breeding of swine, has that universal knowledge which has enabled him to throw light upon the very subject which we have before us. I therefore ask for a few words from Prof. Chandler.

Prof. C. F. Chandler: Well, Mr. President and gentlemen, I am sorry to say that I have never had any experience whatever in feeding swine. I did have the satisfaction at one time of learning something about swine in being a member of the pork commission appointed by President Arthur, but I did not expect to say anything on the subject, and I must confess that I haven't refreshed my memory on any of the interesting facts that came to my knowledge at that time. The fact that impressed me most at that time in the work of that commission was the cleanliness of the hog. He has usually been looked upon as an unclean animal, and I was much surprised to discover that the average hog is a very well fed and cleanly reared animal; and as the immediate object of that investigation was to determine the healthfulness of pork, and as the work of the commission was especially directed to determine the question of whether American pork would suffer in a fair comparison with pork raised in England and on the Continent, the conclusion that we were forced to by that investigation was that of all the pork produced in civilized countries the American pork was far freer from every source of contamination and danger, that there was a smaller percentage of trichinosis among American hogs, and that they were better fed and less swill fed than the hogs of any other country. The majority of hogs raised in America and shipped to Europe are country fed, that run wild in the river bottoms of the West and feed largely upon grass, and they will compare favorably with the hogs raised in France or Germany, where the prejudice against American pork has been cultivated really as a matter of protection. It was really a question of free trade or protection. All the statistics showed that there was less danger to the people in Germany who ate American pork than there was if they ate their own German raised pork. And the same remark applies equally well to France.

I was struck with the statistics which Mr. Bowditch gave us. Some of you may remember that there was a great question whether we should have abbatoirs in New York City, or whether the whole business should be driven out of the city limits. I was one of the few who took the ground that they should be kept within the city, that it was far better to have the slaughtering for New York confined to two or three well appointed abbatoirs than it was to leave it in the old fashioned fifty odd slaughter houses without any sort of official supervision, conducted by irresponsible parties outside of New York. I took the trouble to hunt up some statistics on the subject, and no one would believe the statements I was compelled to make when I found out the facts. It was proposed to drive the slaughtering business out of New York, and we found that the slaughtering business of New York was worth more than the petroleum industry of the United States; more than the anthracite industry of the United States; more than the gold and silver mining industry of the United States. The petroleum industry was worth $50,000,000, a year; the anthracite industry was worth $75,000,000, a year; the gold and silver industry $80,000,000, a year, while the animals slaughtered in New York—that means the cattle, the sheep, the calves and the hogs—were worth $100,000,000, a year! But our efforts at that time were entirely defeated. They were defeated by a prejudiced public opinion, which is often brought about by interested and misguided persons. It originated in the opposition of the counsel for the Roosevelt Hospital in 59th Street. It was proposed to break up the system of slaughtering in some sixty odd slaughter houses and to force the business into three or four well appointed abbatoirs, and so much pressure had been put upon the owners of slaughter houses that they realized that that was the best thing to do, and in order to avoid it being a syndicate, or even a trust, it was suggested that there should be at least three or four slaughter houses, so that there might be a sufficient amount of competition to prevent its becoming a trust, and Henry Draper, at that time was the representative of the estate of Cortlandt Palmer, who had that magnificent building at the foot of 34th Street, 800 x 200, built of glass and iron, with the intention of suppressing Washington Market—or, rather, Cortlandt Palmer having a mortgage on the property, took possession; and Henry Draper spent some $75,000, in converting that into a first-class abbatoir and wholesale market. He took the 400 feet at the western end for an abbatoir, and the eastern end for a wholesale market. That had already been arranged. He had already begun to blast out a cellar for a slaughter house in 59th Street, on the west side, and the butchers on the east side had agreed to take a block over in the neighborhood of 40th Street and make an abbatoir of that, and we should have had three of the best abbatoirs in the world had it not been for this counsel for the Roosevelt Hospital. He took the ground that if a slaughter house where one hundred cattle were slaughtered in a week was a nuisance a slaughter house where a thousand cattle were slaughtered would be ten times as much of a nuisance, not realizing that the capital necessary to slaughter a thousand cattle would be equal to providing a means and machinery to take care of all the refuse. So he got the physicians of the Hospital interested, and they went across the street to the Paulist Fathers, who have a big church there, and went then to an Episcopal Church on the west side, and also got the West Side property owners interested, and the combined influence of those people frightened off the capitalists from the enterprise, and it had to be abandoned. I have no doubt that it is a fact which is unknown to those people up there that the best abbatoir in New York to-day is at the foot of 59th Street, belonging to Mr. T. C. Eastman.

I am sorry that I don't know anything about the feeding and breeding of swine, but I have done the best I could under the circumstances.

Mr. E. F. Bowditch: There is one thing more about swine that possibly may be of some interest to you, and that is our Cattle Commission in Massachusetts. We have had quite an outbreak of hog cholera. I saw one of the commissioners within a month, and he said in following up the cases of hog cholera he had been unable to trace it to anything except where there was a chance, and a probability, that the swine who had taken the disease had had the trimmings of western pork. Some few months ago when the hog cholera was rampant in the State I had it quite badly among my herd, and the only possible way that I saw of their getting it was that my pork barrel being empty from week to week a small amount of pork had been taken from the butcher which we bought and didn't know where it came from. That was the only food that we gave them which was not cooked, and if there is any doubt about the trimmings of pork that you get cooking will remedy it so that there will be no danger from it.

Mr. Theo. A. Havemeyer: What do you mean by trimmings?

Mr. E. F. Bowditch: The pork that you use in pork and beans. You are liable to give it to your pigs, and if it is cooked there will be no danger, even if it has been infected.

The Chairman: Will you tell us of your treatment in hog cholera?

Mr. E. F. Bowditch: I went through my herd one morning, and as I had found from all I could read the safest way was to burn all I could find suffering in that way, I made a little bon-fire that cost me some seven or eight hundred dollars.

Mr. Theo. A. Havemeyer: Some years ago when I was in Europe my son-in-law wrote me that he had a slight trouble on the farm, that the hog cholera had gone through, and had cost us about four thousand dollars. When I came home I thought I would fumigate all the pens, etc., and as the crop of hogs had been killed I went to work and fumigated all the styes. Then I thought I had got rid of it for good. But the next year it appeared again. We have been in the habit just before the sow pigs of giving her a piece of pork, and I am glad Mr. Bowditch has called attention to that fact. It may be a good thing for me to know, because we have never cooked this pork, but just before the sow pigs we have been in the habit of giving her five or six pounds of fresh pork, the idea being that it would prevent the sow surfeiting and so that she would not be inclined to devour her young; and perhaps that may be the reason why we have suffered in our district from the hog cholera. This is of course for me a very serious matter, because I have and do breed five litters in two years. I have a regular system of breeding my pigs, just as I have in breeding my cows. The sow is put in the pen and she must go through her course, and she generally does; and, as I say, I breed five litters in two years.

The Chairman: With the usual number to the litter?

Mr. Theo. A. Havemeyer: The average has been eight pigs. Of course, everything I say you must take on trust. That is understood But I am going to make a little calculation and find out whether the results that I have obtained during the last year will carry out the results and sustain them which were obtained by that celebrated Frenchman, who relates that in a certain number of years he raised six millions of pigs. In eleven years, I believe it was.

Mr. E. F. Bowditch: Yes, that rather surprised me, but he averaged ten or twelve to the litter. But your average would be four millions.

Mr. Theo. A. Havemeyer: I guess I will figure on that. I think "there's millions in it." My pigs will average about 150 pounds, and at eight cents a pound, that would be twelve dollars a pig. Four millions of pigs at twelve dollars each! I think I shall give up sugar refining and go into the pig business, if those facts can be sustained.

Mr. E. F. Bowditch: The reason I spoke so decidedly about that is that I take the refuse from the prison right near me, which contains a good deal of mush, and that of course is all cooked, and this was the only possible thing that was not cooked, and the Cattle Commissioners confirmed my idea; they couldn't trace it to any other source.

Mr. Theo. A. Havemeyer: I don't think we have any swill from my place but what is cooked. We generally take the swill from the house and that is all cooked.

Mr. Otis: I have had a great deal of experience with raising and breeding hogs. Now, it is an old theory among farmers that you should give the sow a piece of pork before she litters to keep her from eating up her litter. A hog never touches her litter unless she is constipated, because if she is constipated she takes the nearest thing that comes to her to relieve her bowels. Now, it is entirely the farmer's own fault if he lets her get into that condition. If he will put some charcoal and sulphur where she can get it she will never eat or touch her pigs. There is no question about that. It is the same with all animals. When they are confined and if they cannot get what nature demands they will eat the nearest thing they can get at, the same as a cow will eat her after-birth.

Mr. Theo. A. Havemeyer: I differ as to that, because in my pigs trough I always have sulphur and charcoal.

Mr. Charles Lanier: I suppose you want something that will reach the bowels.

Mr. Theo. A. Havemeyer: I believe this hog cholera is something in the atmosphere. I think it is more a species of bacteria than anything else. It certainly is a very serious thing. I lost in one year, as I said before, $4,000 worth of hogs. The question is not only how to get rid of it, but how to prevent it. I think it would be very well at the next meeting to ask the experts upon this matter—the State Commissioner of Massachusetts—as Mr. Bowditch has mentioned him. I make that motion.

Mr. Otis: I second that motion. This is a very great subject to every farmer, and Mr. Bowditch has stated the great profit there is in it. I think it is worth while for us to consider it and request some of these gentlemen to address us upon it.

The Farmers then adjourned to December 20th, 1888.

# Proceedings

of the

# New York Farmers

SEASON 1888-89.

PRINT
GLOBE STATIONERY AND PRINTING CO.,
89 LIBERTY STREET,
NEW YORK.

## MEMBERS.

Mr. Daniel F. Appleton,
Mr. John S. Barnes,
Mr. Fred. Billings,
Mr. Frederic Bronson,
Mr. George H. Brown,
Mr. James A. Burden,
Mr. George F. Baker,
Mr. LeGrand B. Cannon,
Prof. Charles F. Chandler,
Mr. Joseph H. Choate,
Mr. Smith Clift,
Mr. Samuel J. Colgate,
Mr. Alfred B. Darling,
Mr. Chauncey M. Depew,
Mr. Henry J. Davison,
Mr. Theodore A. Havemeyer,
Mr. Robert Hoe,
Mr. John J. Holly,
Mr. Adrian Iselin,
Mr. John Jay,
Mr. Charles Lanier,
Mr. J. Lawrence Lee,
Mr. Johnston Livingston,
Mr Pierre Lorillard
Mr. J. Pierpont Morgan,
Mr. J. G. McCullough,
Mr. Levi P. Morton,
Mr. Gilman S. Moulton,
Mr. James Otis,
Mr. George B. Post,
Mr. Percy R. Pyne,
Mr. Francis R. Rives,
Mr. Archibald Rogers,
Mr. F. Augustus Schermerhorn,
Mr. Samuel Sloan,
Mr. James Stillman,
Mr. Thomas Sturgis,
Mr. Rutherford Stuyvesant,
Mr. Walter L. Suydam,
Mr. Jonathan Thorne,
Mr. Henry A. C. Taylor,
Mr. Samuel Thorne,
Mr. William K. Vanderbilt,
Mr. Cornelius Vanderbilt,
Mr. W. Austin Wadsworth,
Mr. John Hobert Warren,
Mr. W. Seward Webb,
Mr. John D. Wing.

### COMMITTEE ON NOMINATIONS FOR MEMBERSHIP.

Mr. LeGrand B. Cannon,
Mr. John D. Wing,
Mr. Frederic Bronson.

## OFFICERS.

President, - - - Mr. FRANCIS R. RIVES.
Vice-President, - - Mr. JOHN JAY.
Sec'y and Treas., Pro tem, Mr. SMITH CLIFT.

Address: 13 West 29th Street.

~~a. S. 2971~~

# The “New York Farmers”

HELD their first meeting of the season of 1888–9 at the rooms of the Lawyer’s Club, Equitable Life Insurance Building, on December 15th, 1888. Mr. Francis R. Rives presided, and announced as the subject of the evening “Contagious Diseases of our Domestic Animals.”

Dr. D. E. Salmon, of the Bureau of Domestic Animals in the Department of Agriculture at Washington, was the first speaker. He said: In accepting the kind invitation of your president to share your hospitality and join in the discussion to-night, I did so with the hope that I would not be expected to read a formal paper, but rather in the anticipation that the greater part of your time would be occupied by the talented and well-known members of your club, who are so much better able to contribute to your entertainment and enjoyment on an occasion of this kind.

The subject which you propose to discuss, however, is one in which I have long felt a deep interest. “The Graver Communicable Diseases of Animals” are of importance to us for two reasons: first, because they are destructive to property, blotting out of existence, by their ravages, millions of dollars of the farmers’ capital each year; and, secondly, because of their effect upon human health, all of them impairing the quality of the food products from affected animals, and some of them being communicable to man himself, producing serious and often fatal effects.

Probably the most widely known of this class of maladies is the contagious pleuro-pneumonia of cattle, for the reason that it is the one disease of animals which has been singled out by Congress as deserving of measures for its eradication on the part of the federal government. Known to be one of the most destructive of the cattle plagues of the Old World, its presence on our soil has long been viewed with alarm, even when it was confined to districts upon the Atlantic seaboard. But when it spread from these and reached the cattle-growing regions, and even the central market cities of the Mississippi valley, it became necessary to act promptly or see the cattle industry of the whole country ruined, by this persistent contagion, not for a year, but probably for generations.

There are few who realize the difficulties encountered by those who endeavored in this emergency to obtain only just enough authority to stop the extension of, and to secure measures for the eradication of this one disease. On the one hand, we were told that the state regulations were unconstitutional, because it was necessary for them to interfere with inter-state commerce, a prerogative which belongs to the national government alone; on the other hand, we were as plainly informed that the national government could do nothing because the internal police regulations came exclusively under the jurisdiction of the individual states. So if we listened to the constitutional lawyers we could only conclude that neither the states nor the federal government had authority to deal effectively with a danger of this kind, and that there was no legal solution of the problem.

Fortunately, the great danger led to some modifications of these extreme views, and by obtaining a sufficient appropriation and some authority from Congress, and combining this with supplemental enactments by the legislatures of the affected states, a practical method has been devised for eradicating this contagion. While the authority conferred in this way is by no means perfect, it has been found possible to carry on the work successfully under it up to the present, and if it can be continued for a sufficient time, the disease will disappear from our land.

I suppose most of those present will be surprised at the amount of work which I will tell you has been accomplished, for there are very few of our people who have even a faint idea of it. The infected Western States, viz., Ohio, Illinois, Kentucky and Missouri have all been freed from the contagion. Pennsylvania is now practically free from it. It has been eradicated from Delaware, Maryland, once a very hot bed of pleuro-pneumonia, is now nearly free from it. New York and New Jersey are the only States in which it still maintains itself, and in these much progress has been made in controlling it and in decreasing the infected area.

To give an idea of the amount of work that has been required you will pardon me, I hope, if I introduce a few figures. From January 1 to November 30, 1888, our force inspected 35,604 herds of cattle, containing 305,280 animals, or considerably over 1,000 animals for each working day. And this inspection was not limited to a cursory glance over the external surface, but in each case the lungs were examined by auscultation and percussion in order to detect any disease of those organs. Of this number 183,257 were tagged with a numbered metal check, suspended in the ear after the manner of a lady's ear ring, and the numbers of these were recorded in the books of the Bureau of Animal Industry in such a way that, given the name of a cattle owner, we could at once tell what cows should be in his stable, or, given the number of a cow found anywhere in an infected district, we could at once ascertain the owner.

Very stringent regulations have been required to prevent the constant dissemination of the disease by the sale of cattle from infected herds and by the mixing of different herds upon open lots and pastures used in common. To prevent this and to avoid any opportunities for concealing the disease by surreptitious removal of affected animals, owners in the infected districts have been required to take out a permit from our office before moving any bovine animal from their premises. Experience has shown that these measures are none too strict, for in spite of our utmost vigilance, an occasional violation would be committed which could afterwards be traced by the extension of the contagion.

In order to discover the affected herds, we did not rely entirely upon an inspection of the living animals, but *post-mortem* examinations were regularly made on all of the cattle which died of disease in the infected districts and on many of those which were slaughtered for food. In the period from January to November, inclusive, our force has made *post-mortem* examinations upon 43,176 carcasses, being about 150 for each working day. By these examinations 3,426 cases of pleuro-pneumonia were discovered. During this time there were condemned and slaughtered, because of disease or exposure, 8,139 head of cattle.

The successful completion of this work is of great interest and importance for many reasons. While the contagion exists on this continent, it is a constant menace to the one thousand million dollars invested in bovine animals in the United States, and to that part of the food supply of the nation which these animals represent. It causes restrictions upon our inter-state commerce which have caused more hardship and loss than the disease itself. It has caused restrictions to be placed upon our foreign commerce so burdensome that our exporters of fat cattle do not realize as much by $10 or $12 a head as is obtained by Canadian exporters. And the gain of this $10 or $12 a head means more to the cattle raisers of this country than the one or two million dollars which the exported cattle would bring in addition to present prices—it means better markets in the United States and an immediate increase in the value of every steer that is sold.

It is safe to say that the European restrictions will not be removed until pleuro-pneumonia is completely eradicated, and to accomplish this those who are engaged in this work need the constant and earnest support of every man who is interested in the welfare of the cattle industry. Even the consumer who desires his steaks and roasts from cattle untainted by disease—and what consumer does not—should stand by us in this work until complete success has crowned our efforts.

The cattle growers organized to secure the necessary authority and appropriations. As the work goes on, however, and the infected territory becomes smaller and smaller, the danger becomes less imminent and the interest dies out. It is more difficult now than it ever was to maintain and enforce the regulations; it is more difficult now to secure the conviction of those who violate the regulations; it is becoming more difficult to secure the co-operation of state authorities, and there is no longer the public sentiment in the infected states which justifies the arbitrary measures required for the speedy and effectual suppression of outbreaks. This condition of affairs is alarming because if we do not succeed, with our present generous appropriations, in securing the last affected animal, the contagion will again spread, and the public faith in the efficacy of government control will be lost. The crisis will come after success appears to be assured, for it is then that people become restive under restraint and refuse to recognize the necessity for burdensome regulations.

I dwell upon this aspect of the question because this club has great influence through its organization and through its individual members; and I should be glad to awaken an interest which would live beyond this evening of entertainment and pleasure and bring additional strength to this great public work.

The glanders of horses and mules is one of our most widespread diseases of animals, and one of the few which have been more or less regulated by state legislation. The annual loss from this malady is very heavy, but we have not sufficient data to make even an approximate estimate.

When we remember that glanders is an incurable disease, nearly always fatal, that it has been communicated to people and produces in them the same dangerous effects as in the horse, we cannot but appreciate the importance of dealing promptly and energetically with the plague. There is not a state free from this contagion, and some of our states have been so indifferent that it has extended until glandered horses are found everywhere at work upon the public roads and streets, drinking at public watering places, and blowing the infectious discharge from their nostrils into the faces of the passer by or those who ride behind them.

The individual states find it as difficult to control this disease as it is to control pleuro-pneumonia. Affected or exposed animals are brought in from other states, or the diseased horses are taken from state to state to elude the local authorities. These difficulties, incident to local administration, have discouraged those who have attempted to secure the eradication of animal diseases and have led them to turn their eyes to the national government as alone having sufficient jurisdiction, power and money to ensure success.

The most destructive communicable diseases of animals at present existing in this country are those which affect swine. The proportion of our exported meats affected with trichinæ has given Germany and France a reason upon which to base their prohibition of American pork products. This prohibition has prevented us from marketing our surplus, and has so affected prices as to react seriously upon the farming industry.

There is much about this disease, known as trichiniasis, which we do not understand. We cannot, for instance, explain where this parasite is obtained by the hogs which feed over the vast prairies of the West. One would suppose that the conditions of existence there are most favorable for the health of the hog, and that the chances of parasitic infection are reduced to a minimum. There is here a field for scientific investigation which we hope to see occupied by some of our bright young scientists who are looking around for some problem to attack, the solution of which will bring them reputation and fame.

The most fatal diseases of hogs are those which have formerly been grouped together as hog cholera, but which we now know to be two distinct diseases. Our annual losses from these diseases vary from ten to twenty millions dollars, and up to this time may be considered as unavoidable. When the Bureau of Animal Industry began investigating the subject a few years ago, there was scarcely anything definitely known of the nature and cause of these diseases. The scientists of the old world had been puzzled by them and held the most diverse views. To-day we understand these diseases. Their germs have been discovered and studied. The changes produced in the animal body by each of these parasitic germs have been studied and described, so that it is now possible to make a diagnosis, when we encounter an outbreak of disease.

So much for science. Now what of the practical results? How are these ravages of disease to be prevented? Evidently not by medical treatment, because when one hog is sick the whole herd has been exposed, and with animals of small individual value it costs too much to give them medical attention. And even with the best treatment, the plagues are still too fatal and destructive for us to stop with such measures with any satisfaction to ourselves or the farmers.

Here, as with other animal diseases, we can only hope for success by enforcing sanitary measures. Our stock-yards and stock-cars must be freed from contagion, and wherever the contagion appears upon a farm it should be summarily and at once destroyed. While there is so much danger of introducing the disease with every new purchase of hogs, and while diseased hogs are allowed to run upon highways and scatter the contagion wherever they go, or are even allowed to live and manufacture and exhale contagion, so long will these plagues be widespread and destructive. The individual farmer can do something by enforcing measures to prevent the introduction of contagion upon his premises, but he is more or less at the mercy of his neighbors, and only the power of the state or nation can secure for him absolute immunity.

Passing over a number of diseases of considerable interest I will only add a few words on the subject of tuberculosis. This disease, so common among cattle and people, is attracting more attention to-day than almost any other medical subject.

Taking the last census as a basis for calculation, we should estimate the number of deaths from tuberculosis among our human population at from 150,000 to 160,000 per annum in the United States. This is an enormous number, and to lessen it, is a subject well worth the consideration of the sanitarian, the statesman and of the individual citizen.

What strikes us most forcibly in this connection is, that the species of domestic animals which contributes most to our daily food supply, is the very species which is most affected with this same disease. While steers are subject to this affection, it is among the dairy cows that we find it most prevalent.

The science of the last few years has shown tuberculosis to be a communicable disease. It is caused by a minute vegetable parasite—a bacillus—and without the presence of that parasite no tuberculosis can develop. This parasite, or, as we are in the habit of saying, this germ, cannot live outside of the animal body for any considerable time, nor can it multiply outside of the body except under the special conditions supplied in the laboratory.

We must conclude from these facts that every case of tuberculosis originated directly or indirectly by contagion or infection from some other affected person or animal. Contagion from person to person in this disease we know to be rare. Infection from the dried and pulverized expectorations of tuberculous patients, which we inhale as dust either in buildings or on the streets, is doubtless a potent and frequent cause. But we know that the milk from tuberculous cows will often produce this disease in calves and pigs, and there is also reason to think that the juices from the flesh of tuberculous animals will effect the same result.

Knowing, then, that the dairies are so badly affected, and that the milk and flesh of tuberculous cows goes upon our markets and is sold with impunity, should we not look to this as the source of a portion of the mortality from this dreaded disease?

There are many problems here which can only be definitely settled by careful and prolonged scientific investigation. The only opportunity for such investigation in this country, and the only adequate organization for the control of the communicable diseases of animals are found in the National Bureau of Animal Industry. This bureau was started modestly and it has endeavored, by careful and untiring service, to merit the good will and support of the people of this country. Such work is an experiment with us, and there are many who neither understand nor appreciate its value. Politicians look with longing eyes upon the appropriations and the patronage, jealousy crops out in such malignant forms that it would ruin where it cannot rule, trade interests fear regulation and would smother any source from which it might come. These are dangers and difficulties which must be met and overcome; and I trust to the enlightened public sentiment of this country, and to such bodies of progressive and liberal minded citizens as I see before me, for the active sympathy and support which is needed to ensure a successful future of this important branch of the public service.

Dr. Hopkins then made the following remarks:

Mr. President and Gentlemen—Contagious diseases of our domestic animals is a subject of great importance to all individuals interested in agriculture or stock breeding; and if we examine the history of foreign countries, ancient or modern, it will be found that those nations which have attained a high agricultural prosperity owe it to the enactment of wise laws fostering an industry which is the true foundation of a nation's greatness.

We have from two to three times the number of cattle, in proportion to population, as compared with the principal countries of Europe, five times as many swine, and nearly three times the proportional number of horses as in France, the German States or England. The demand in our markets for a better class of animals has induced our intelligent breeders to elevate the standard of their stock by the introduction of improved blood of whatever strain their judgment or fancy deemed best; and in doing this, they have been obliged to enter the markets of the world. This, together with the increased facilities for transportation, renders the business very dangerous through the liability of animals in transit contracting disease by being compelled to pass through localities where contagious diseases exist. While I was Cattle Inspector in New York in January, 1881, I remember that ten head of fine Jersey cattle were shipped from London by the steamer France, and they arrived in New York suffering with foot and mouth disease. The steamship had formerly carried cattle from the continent of Europe to England, and had become infected from diseased cattle. Another instance occurred while I was Territorial Veterinarian of Wyoming. Mr. Richard Frewen bought fifty head of thoroughbred short horn bulls in Kentucky for use on his ranch in Wyoming. These animals while en route stopped for rest and feed at the stock yards in St. Louis, Mo., where they were exposed to the contagion of Texas fever. I examined these animals and made autopsies of many of them, which demonstrated the peculiar character of the disease. Nearly all died.

Glanders and farcy is the most widely spread of all plagues which afflict our domestic animals. It can be found in almost every county in the United States. It is a disease of the temperate climate; rare in hot or very cold countries. It is a malignant and fatal disease, due to the introduction into the animal economy of the germ peculiar to the malady, which affects the whole system and shows its specific action in the nasal cavity and lymphatic glands and ducts. Glanders and farcy are in reality one and the same disease, the term "glanders" being applied when the disease is localized in the nasal cavity and glands, while "farcy" attacks the lymphatic glands and ducts inside, the hind legs, abdomen, fore legs, neck and face, forming abscesses or "buds" which rupture and discharge a peculiar pus, and cause ulcers having no tendency to heal. Inoculation of a healthy horse with the virus of glanders is apt to produce farcy, and vice versa. In the horse the disease assumes a variety of forms—as, acute glanders, chronic glanders, glanders of the skin, glanders of the lung, acute and chronic farcy. The most common form of the disease in the horse is chronic glanders, while in the mule the disease is generally acute and fatal in about twenty days. Man contracts glanders from the horse and suffers a most loathsome death.

The laws of the state of New York make it a crime for any person to sell or dispose of a glandered animal, and the "American Society for the Prevention of Cruelty to Animals" is very active in prosecuting offenders, and has in the past been successful in punishing individuals who made a business of selling diseased horses. This society has authority to seize any glandered animal and order it destroyed. If the state would offer an indemnity to owners of glandered animals the disease would soon be stamped out.

Remedial agents when applied to animals suffering with glanders or farcy are merely palliative. There is no cure. The acute symptoms may subside for a time, but reappear, when any cause of debility is imposed on the animal, such as exposure, hard work or sickness.

In the Western country glanders prevails to an alarming extent. During my term of office in Wyoming, I ordered nearly 600 horses and mules destroyed which the territorial government paid for at the rate of two-thirds of the sound value, upon a just appraisement. In Kansas where the government does not pay an indemnity, glandered horses are secreted, bartered off, or the state veterinarian held up by an injunction. In the state of Iowa the veterinarian reported having destroyed 350 glandered horses in one year. The Sanitary Commissioners of Nebraska reported 270 in three months, and all the rest of the Western States are active in stamping out glanders.

In August, 1887, reports of the existence of a peculiar venereal disease among the horses of Illinois, induced the Governor of Wyoming to request me to proceed to that state, and make an investigation and forward a special report in the interest of breeders of horses in that territory. Through the courtesy of the Sanitary Commissioners of Illinois, I was afforded every facility in making examinations of the sick animals, and I found that the disease was the fatal " Maladie du Coit " of France, or the " El Dourine " of the Arabs. Dr. Williams of Illinois calls it the "Syphilis of the Horse." The contagious and fatal character of this " Maladie du Coit," has been recognized in Europe for the past century, and many eminent veterinarians of Europe have in the past devoted much time to a study of its peculiarities and demonstrated its nature. Veterinary literature records its existence in Prussia in 1796, although it is believed to have existed in Southern Russia before that period. In 1815, Woltersdorf observed it in Austria, and Haveneau reports it in 1816. From this time we have accounts of its spread over the different countries of Europe. In 1847, it was reported in Algeria by the French veterinarian Signol. In 1851, the disease was imported into France and spread to 31 communes around Tarbes.

The origin of " Maladie du Coit " in Illinois is unknown. The disease first attracted attention during the breeding season of 1885, and as the cool weather approached, it seemed to die out. In 1886, it again appeared, and on its re-appearance in 1887, some veterinarians were called in to investigate, and it was only after considerable study of its peculiarities, and the appearance of a large number of cases developing the same symptoms, that a diagnosis was made. The unwelcome truth was then forced upon our breeders that another of the plagues of Asia had been imported into our country notwithstanding repeated warnings and petitions to our legislators in Congress, from eminent veterinarians, asking that stringent quarantine laws be enacted and rigidly enforced where importations of breeding animals might be brought from any country, in which contagious diseases are known to exist.

" Maladie du Coit " is a disease peculiar to solipeds, equine and asinine. It is contagious and is transmitted in the act of copulation. The disease presents both local symptoms, affecting the generative organs, and those of a general character affecting more or less every organ of the body, producing a state of marasmus and great emaciation. It affects the nerves to a marked degree, ending in paralysis of the posterior extremities prior to death. Some medical authorities have imagined it to be allied to human syphilis, basing their supposition on the course of the local symptoms, and on the serious character of some of the pathological alterations. Recent experiments by able investigators, however, have failed to reproduce human syphilis by inoculation in the mare, and therefore, all stories about the transmission of syphilis from man to the mare may be dismissed as having no foundation.

Previous to the fatal character of this disease being publicly announced, a number of stallions were sold and shipped to distant parts of the country for breeding purposes; and I was called to examine a herd of horses in Colorado and found them suffering with the malady. I have been informed by the Territorial Veterinarian of Montana that one herd of horses in his territory had the disease, but fortunately they were quarantined before any great damage was done. Wherever stallions have been shipped, full information of the dread pestilence has been forwarded. The Live Stock Commissioners of Illinois, at the date of my visit, had over 200 mares and nine stallions in quarantine, and were using every effort to prevent a spread of the disease.

As a rule the progress of the disease is slow, but its termination is most frequently fatal. Remedial agents are very unsatisfactory. It is much better to castrate all affected stallions and put the mares at work in cities, as the disease may contine from three months to three, four, or even five years.

Influenza has been classed as a contagious disease by some veterinarians. The history of this disease among men and animals in the old world indicates that in the past it has been a fearful scourge. In this country, with the exception of the great epizootic of 1872, it has assumed generally a mild charter, and readily yields to remedial agents. During the late epizootic, every stableman's idea of the treatment of sick horses was given wide publicity by the press, but as a result of improper treatment, and of people being obliged to work sick animals, the mortality was very great. No other disease of the horse is subject to so many complications or requires more careful and skillful attention at the hands of owners and veterinarians.

A form of distemper in the horse called "strangles," though not generally contagious, may under certain conditions appear to spread. I have known this disease to develop on ranches, and it appeared to spread from one colt to another, scarcely an animal under three years of age escaping. Strangles is a specific febrile disease of the horse—in which the pyrexial symptoms are not invariably well marked, but are characterized in those cases which take a regular course, by the eruption of one or more abscesses between the branches of the lower jaw, which on reaching maturity discharge pus. In the malignant form abscesses occur either externally or on the internal organs, generally with fatal results.

Contagious pleuro-pneumonia, or the lung plague of the bovine, takes the front rank of contagion among the cattle of this country. This plague is one of the zymotic diseases, and has spread from the steppes of Russia to almost all parts of the world. The only class of animals affected by it are bovines. The germ peculiar to this contagion gains access to the system through the respiratory organs.

After exposure to the contagion there is a stage of incubation of from eight days to three or even four months, followed by complications in the form of extensive exudations within the substance of the lungs, and upon the surfaces of the pleura, resulting in consolidation of a portion of the lungs, occlusion of the tubes, embolism of the vessels, and, generally, adhesion of the pleural surfaces. In some animals there is rapid and extensive distinction of lung tissue, with death from suffocation; but most commonly the disease is of a lingering character, symptoms of great prostration manifesting themselves, with blood poisoning from absorption of the degraded pulmonary exudates and death from marasmus. No animal ever makes a perfect recovery from this disease, though the different organs of the body, with the exception of the lungs, may return to a normal condition. The solidified portion of the lungs becomes an encysted mass, cut off from the circulation, and after undergoing certain chemical changes, occupying months, is at last absorbed into the system. Instead of recovery, such an animal becomes a chronic case of the lung plague, and notwithstanding an immense diseased mass encysted in the lungs, (if a cow), will, if put to the bull, 'carry a calf and give milk; and to all outward appearance, be as healthy as any cow in the herd. Such an animal will, if introduced among healthy cattle, spread the contagion of pleuro-pneumonia. It requires a physical examination by an expert to detect these cases of chronic disease. The spread of this disease to the cattle of the Western States and its extension to Chicago, is a matter of history, with which I presume you are all familiar, but living at this distance you can scarcely appreciate the alarm which prevailed among the owners of the countless herds which roam at will upon the plains. The people of the whole country west of the Missouri River owe a debt of gratitude to the legislature of Wyoming, who, directed by the Speaker of the House, Mr. Lane, Judge Carey, Mr. Thos. Sturgis, and a few other gentlemen, enacted a substantial quarantine law, and created the office of territorial veterinarian, with ample authority to prevent the importation of cattle from infected localities. But for this timely action, this contagious disease would have reached the cattle on the unfenced ranges, and have become a permanent source of loss; in fact, the history of Australia and Africa would have been repeated. No power on earth can stamp out contagious pleuro-pneumonia from those countries.

Tuberculosis among cattle has of late attracted much attention, because it is claimed that there is a liability of transmitting this disease to the human family through the use of meat or milk from diseased animals. After years of inspection of dairy herds and cattle in different parts of the country, I believe that the chances of conveying the disease through meat or milk are very small. It might be done if meat were taken direct from an animal suffering with acute tuberculosis into the human stomach without cooking; but even then, unless this meat contained tubercules, it would have no effect. In my experience, when a cow is sick with any acute illness, the secretion of milk at once ceases. Phthisis Pulmonalis—that is, an ulcerative lung disease, as it affects man, is very rare in the bovine family. Professor Williams, an eminent veterinary authority, has classified tuberculosis as it occurs in cattle, under three heads—as follows:

1—Tubercular dysentery.
2—Granular inflammation
3—Scrofulous infiltration of glands.

In the first form of tuberculosis, as in man, the lower parts of the intestines are the seat of the growth and ulcerations, but the second form, granular inflammation, with caseous and calcareous tumors involving the lungs, serous membranes and glands, is the most common. In this form the earliest symptoms are those of unthriftiness, and a deterioration in the quality of the milk. If the cow is in calf, abortion is apt to occur, the appetite is capricious, the mucous membranes are pale, there is a dull dry cough, and the skin is dull and the hair lifeless. The cough becomes troublesome and emaciation is rapid. If the lungs are involved there will be a copius and foetid discharge from the nose. The animal continues to decline until relieved by death. The third form of scrofulous infiltration of the glands is characterized by the formation of abscesses in the parotid and sub-maxillary region, which at first appear as movable nodules, gradually enlarging and becoming adherent to the skin, and after a time ulcerating and leaving a raw unhealthy ulcer, from which an ichorous or sanious discharge continues to issue.

From the reckless transportation of southern cattle, north of the 36th parallel of north latitude, infecting cars, stock yards, roads and pastures, hundreds of northern cattle are annually exposed to a contagion which produces in the majority of cases the fatal sickness—Texas fever. A few years ago, I was located at Ogallala, Nebraska, where a train of cattle were unloaded direct from Texas. A week later the Continental Cattle Company drove two herds of nearly 6,000 head of cattle across the trail made by the car cattle south of the North Platte River. About a month later, I saw the Continental Cattle Company's stock on the plains in Southwest Dakota, and they were suffering with Texas fever, and for many days the mortality averaged 100 head.

During the year 1887, twenty-eight outbreaks of Texas fever occurred in Illinois from the handling of southern steers. A large number of cattle are annually lost in the Northern States from this disease, which, with proper legislation, restricting the movement of southern animals, can be prevented.

For the last forty years, hog cholera has existed among the swine in this country. It is believed to have originally been imported from Europe, but by whom, or the exact time of the importation, is not, and never will be known. This disease is spread in the same manner as the lung plague, and causes an annual loss variously estimated at between ten and twenty millions of dollars. The disease at present exists in two-thirds of the states.

Another source of considerable loss which came under my observation out West, is verminous bronchitis in calves and lambs. This disease is occasioned by the entrance into the bronchial tubes of a parasite—the *strongulus micruris* in calves, and *strongulus filaria* in lambs. Animals suffering with this disease will infect the pastures, which will harbor the parasite for at least one year, spreading the disease to all new comers. It readily yields to treatment, however.

Black leg, quarter ill, braxy, splenic apoplexy, carbuncular fever, symptomatic fever and gloss-anthrax, are all different forms of the same disease—anthrax—horses, cattle, sheep and swine being all victims of this malady. It exists in all parts of the country. Professor Pasteur of France, through his investigation into the causation of this disease, has matured a virus for the inoculation of animals, which is entirely successful in the prevention of the disease in his country. Animals dead from this disease should be deeply buried in lime. The removal of the skins of such animals should be prohibited, owing to the great danger of inoculating man, producing malignant pustule. Anthrax in this country is generally due to some dietetic error, such as continuous high feeding, or suddenly changing the animals from a dry coarse fodder to rich succulent grasses, and taking into the system more of the elements of nutrition than can be utilized by the tissues, or excreted by the ordinary channels, thus inducing a condition of poisoning. In animals under two years the disease is called black leg, quarter ill, black quarter, and in adults splenic apoplexy, symptomatic fever, etc. Swine eating of the carcass of animals dead of anthrax are inoculated and die of black tongue (gloss-anthrax). I was called to investigate the cause of death in a herd of sheep on the plains of Laramie where the mortality averaged fifty head a day. That year the spring was late, and after a week of very warm weather the grass grew very rapidly. The herdsman had kept his sheep at pasture night and day, and as a result his sheep were dying of braxy. He followed my advice and only grazed his animals six hours daily, and the mortality ceased. The records show that a few years ago, fifteen hundred people in St. Domingo died from eating the carcasses of animals that had died of anthrax. Yet I have been informed by old frontiersmen that they have seen calves die of black leg on the plains, and the carcass eaten by Indians without any ill effects.

Abortion in cattle under certain conditions is either sympathetic or contagious—at all events it is a source of great loss to owners of cattle. This is a subject which I commend to your consideration.

Hydrophobia or canine rabies is one of the most terrible of all communicable diseases of domestic animals, and words of mine are useless to impress you with the importance of fostering veterinary science as a means of securing for ourselves and animals immunity from this horrible disease. Some years ago, while in practice in New York City, I was called in consultation with a physician to see a man and dog. The gentleman had been bitten by the dog some weeks previously, and within a few days the animal was taken sick. The dog's sickness, and fear of hydrophobia, so preyed on the gentleman's mind, that unless something was done he would surely die. I examined the dog and found him suffering simply with an aggravated constipation. A full dose of Syrup of Buckthorn was administered to the animal, and the gentleman with his mind relieved from the dread of hydrophobia, was able to leave the house next day.

There are also various parasites which afflict our domestic animals and man, some externally producing diseases of the skin, and others internally affecting different organs; and the peculiar forms they assume in different species, and their methods of transmission from host to host, are subjects of vast importance, either from a sanitary or a commercial point of view.

After the adoption of Mr. Sloan's tribute to the members recently deceased—Messrs. Dinsmore, Potts and Agnew—Mr. Jay said:

Mr. President: In view of the grave importance of the subject which has been so ably discussed this evening by the distinguished experts who have addressed us, bearing as it does, not simply upon the health and life of animals, but of persons, I beg leave to suggest whether this club may not with propriety take some steps to assist in enlightening public opinion, and to arrest or lessen the evil by legislation. Dr. Hopkins suggested the importance of liberal appropriations by the state for the killing of horses affected by the glanders, a disease easily communicable to persons, and of a proper quarantine regulation by the national government, to prevent the landing of diseased animals, whose coming is attended with such wide spread dangers.

The character and influence of members of this club command respect throughout the country; and its deliberate views on a question of such national importance should carry weight, and aid in arousing public opinion to the extent of the danger and the necessity of prompt action.

I beg leave, therefore, to move that Dr. Salmon, Dr. Hopkins and Prof. Chandler, be requested to consider and advise us of such action as they would recommend us to take, and to formulate memorials to the state legislature and Congress as they may deem expedient.

The "Farmers" then adjourned.

---

At the meeting of the New York Farmers, Saturday, December 15, 1888, (before dinner.)

Mr. Jay moved the appointment of a special committee in reference to the formation of a club library with instructions to learn whether the Trustees of Columbia College will kindly allot for its volumes an alcove in the College library.

The resolution was unanimously adopted, and the President and Secretary with Professor Chandler were appointed such committee.

# The “New York Farmers”

MET again at the Hotel Buckingham, on January 24th, 1889, Mr. Francis R. Rives, presiding.

In opening the proceedings, Mr. Rives said: The subject for discussion this evening is “Farm Structures and Fences.” It seems to me that the time has come, so far as the Eastern States are concerned, to look more than formerly to the permanency, durability and sightliness of our farm structures. It is often a source of annoyance and expense to a farmer, as soon as he has gone the round of renovation and repair, to find that he has in a few years to go over again the same toil. Wood seems, by a natural course of events, to be becoming dearer, and the more lasting materials to be becoming cheaper. I have heard it said that a stable of brick is necessarily damp, and therefore, unwholesome, but the dryest stable that I have yet seen is of brick, where the walls were hollow and precautions were taken to intercept the capillary attraction of the moisture from the earth by a course of blue stone or slate and cement at or near the ground level. It is quite possible also, notwithstanding a popular prejudice to the contrary, to build an ice-house that will keep of more durable materials than wood. Everyone, I suppose, must occasionally have observed the constructive ornamentation of a fence replete with obtrusive vulgarity. Simple wire fences undoubtedly in some places are useful and will answer, but I have not yet chanced to find the man who has turned out horses in a lot surrounded with wire fences who has not most bitterly regretted it, unless the fence chanced to be surmounted with a top wooden rail. Horses are endowed with an extraordinary memory and a very brilliant imagination, but unfortunately they have very limited reasoning powers in so far as the question is concerned of going safely over and through a wire fence. In England, the wire fences are being more used than formerly in consequence of their cheapness, but they are a frightful hindrance to a great national industry—I mean, hunting. When the men encounter these obstacles, they generally take off their coats and hang them over the fence to indicate to their hunters that it is an obstacle to be overcome, and then they resume their garments. There is a fence to which I would like to call attention, which I believe originated in the town that is represented here to-night by Colonel Waring. It was made first, I think, by the oldest architect of that place, Mr. Mason. It is, in my judgment, very sightly and durable, and I know it turns horses and cattle admirably. It is of gas pipe wrought iron of an inch bore cut in lengths of eight feet and inserted in posts at that interval. I think that is worthy the consideration of any gentleman.

I regret very much this evening that we are not favored with the presence of Brother Depew and Brother Choate, because they are most admirably qualified to speak on the second branch of the subject, for I know no persons who are more consummate masters of fence, and I may say, of raillery. (Laughter and applause.) But fortunately we have present with us several gentlemen who are perfectly familiar with these questions, and who, by their learning and knowledge, can throw great light on them. I will first call upon the Hon. Edward Burnett.

Mr. Burnett said: Mr. President, gentlemen and fellow-farmers—The subject of farm buildings is one that has interested me, and to which I have paid a great deal of attention for the past eighteen years. I look upon them, though, entirely as a manufacturer and from a practical point of view, and I think you gentlemen will all agree with me, that no matter how good a thing may be, or how expensively it may be built, if it is not practical it loses its value. In taking up the subject of farm buildings, I can just simply give you a few ideas in regard to buildings for dairy cattle, and, perhaps, I may touch upon those for swine. Those are the only buildings with which I am familiar. I agree with our chairman that there is no class of buildings that should be built here in the east more thoroughly than our stables. I have found on the other side, especially on the islands of Guernsey and Jersey, stables that have been built for 100 and 150 and 200 years, and that to-day are in a good state of preservation. I have always said that a good farmer in going about on his travels will find something to interest him and something new, and no matter where he goes, or on to what sort of a farm, or how poor a farmer may work it, there is something that he can get that will be valuable to him. Those Jersey stables are the simplest in the world—small stone buildings with cobble or cement floors. They have that fault of which your chairman speaks—they are damp; but the cattle there as a whole are as healthy as any I have seen either abroad or in this country. In building stables—I am going to speak now from a practical point of view—if a man wishes to build a stable that shall be convenient for his cattle, and at the same time durable and not expensive, I do not believe in barn cellars, but I do believe in covered manure pits. I think the location of a stable is fully as important as that of your dwelling house. It should be on a side hill, if it is possible, and then it should be so constructed that your cattle should, during the winter and in inclement weather, get the most protection possible. My idea, and I have carried it out quite successfully within the last few years, has been to build my main structure, the feeding barn, or the barn from whence the feed is drawn, on a side hill, carrying the fodder—which with nine-tenths, yes, ninety-nine-hundredths of farmers is mainly their hay crop—into the top of the barn, filling up the structure with the fodder and then running it out from that barn on the under or lower side, your cow stable being perhaps on one side and a horse stable on the other. In that way, you obtain the most perfect protection possible for your animals in inclement weather. A dairy animal, as I have told you before, is not altogether the result of breeding; I do not think breeding enters fifty per cent. into her composition; she is artificial and her organization is one of the most delicate in the animal kingdom; it is made by the skill and care of the man that develops the animal. The dairy animal should have the best of quarters. They should be light, clean, well ventilated and warm. These stables can be arranged so that you can carry from a big supply barn fodder for perhaps 100 head of cattle; but if you do that, I should advise two wings to this barn or to the stables; for I believe cattle like room—do not want to be crowded together—and you do not want to have more than 50 together in any one stable. I think Mr. Moulton will bear me out in this. I do not know any gentleman in England who has as many dairy cows on the same number of acres as he has, and on visiting his farm a month ago I was very much pleased to find that his ideas coincided with mine. The importance of getting in a good foundation ought not to be overlooked, for there is no class of buildings in which the sills rot as quick. With the urine and continual moisture, the sills in the barn or stable, even if they are the best of chestnut, are liable to give way within 10 or 15 years in the most exposed places, and for that reason I believe it would be economy to build your stables at least three feet above the ground of stone or brick. Then I am strongly in favor of having stone and brick, or cement or asphalt floors. For the last 18 years, I have bedded my cows entirely upon loam or sand, and I have found that they would do better on that than on dry litter. Take an ordinary cow stable, for instance, and the loam is an absorbent and also a disinfectant, for which ordinary bedding is useless. You can use either sand or loam, according to the farm. If you have a hilly farm and rather a light soil, the loam that absorbs the urine and goes down into your cellars, is worth almost as much as your manure, and you would be astonished at the amount of moisture that a shovelful of dry earth will absorb. I think Colonel Waring says the parts are something like 16 to 1; that is a quart of dry earth will absorb 16 quarts of moisture.

Colonel Waring: Absorb and evaporate.

Mr. Burnett: It is astonishing. I use it largely in my piggeries, and I kill the odor almost entirely by a sprinkling once a day of dry lime. I get it in July after the haying, and I store it in large quantities under cover. The interior arrangement of a barn, of course, you can vary according to the amount of money that you wish to expend. I do not believe in the old fashioned stanchions; I think a chain is much better and gives the cows more leeway. If a man has a thoroughbred herd, I should have the stalls low, not over two feet from the ground. A stall properly constructed should have a feed box about two feet square, and I should have them right on the floor. The natural feeding position of any of our animals is to take their feed from the floor. I think it is a great mistake with horses to make them reach up to their hay; it is a great deal better to let them take it right from the floor, and the same way with cows. In constructing my stables, I allow for the Jerseys about 4½ feet back of the feeding box; then with a six-inch piece of timber, which forms the dividing line between the feeding box and the stall proper, I add two feet for the feeding box, and I have a stall which occupies just seven feet, and in width from three feet six to three feet eight inches. I am a strong believer in having a trough behind the cattle and raising the stall behind so that there shall be a drop of at least four inches. I think it adds a great deal to the ease in keeping your cows cleanly and making them look tidy; it sets the cows off. If you have a thoroughbred herd, and you enter a stable and you simply find a clear line, not in any way obstructed, and see the backs and heads of all these animals, it sets the cattle off, and adds a great deal to their beauty—and also to their value, if you have got a buyer. But for an ordinary stable, if I were to take 50 grade cows and look at them like 50 machines to get so much butter and milk and cream out of, within a given space of time—8 or 10 or 12 months—I should not care whether I could see them when I entered the stable or not, but should merely try to find out the cheapest way to have them easy and comfortable. Another most important thing in any stable—and mistakes are made in this respect by gentlemen who can afford many times over not to make them—is to have an ample width of the passage ways and doors. You want plenty of room for your cows. You want back of your cows at least six feet, and eight feet is better. It is a great mistake to try to economize on the width of your stable. You can tie up very comfortably and give a passage way of 12 feet behind a double row of cows and have five feet in front of those cows, and with your seven feet of stall, you can have sheds running out 75 feet—two sheds for instance, constructed as I have described, with three or four feet of brick or stone work and then the shed, with nothing but the rafters of the roof, and with plenty of light which is a most desirable thing—any number of widows and the windows high enough to let in the light and air—you can construct a stable of that sort for $7 or $8 a running foot under contract. A wooden stable of that sort I have built for $4 a foot. It was a cheaply constructed building, but it answered the purpose and the cows did very well. Another important feature is to have a place in the stable to water the cattle. At one end or the other or in the center, you should have a trough connected with steam or some heating apparatus so that the temperature of the water in winter should not be under 70° or 80°. That makes a great difference in the value of your milk and the condition of your cow. I have seen a herd of exquisite Jersey cows turned out in the middle of February, with the thermometer lurking at zero, into an icy slippery yard and go to a trough where the hired man had broken the ice with a hatchet, and drink their fill, every individual hair on each cow's back standing up straight. When they go back to their stables, no matter how warm those stables may be, it takes them at least two hours to get over the chill. Then I do not want it to be understood, because I do not advise a cellar, that I care nothing about my manure or that I am ready to throw it out to be exposed to all weathers. With a trough behind your cattle 12 inches wide and four inches deep, at least seven-eights of your droppings will fall into that trough, and with a wooden hoe or any tool you may have on hand, that manure can be gathered two, three or four times a day, and taken down to one end of the building and thrown into a pit. That pit you can have large enough to hold three or four months, or the whole winter's supply, but it should be well covered and protected.

I have been very successful with my horse stable. My idea was largely gotten from Jersey. I built it of stone. My only regret is that I did not line it with brick and leave a space, because in the spring of the year the walls are sometimes damp and show signs of moisture. That stable is paved with brick—common country brick at $8 a 1,000—placed edgewise. I think I built that stable in 1882, and I have never spent a dollar on it since. The partitions between the stalls are the only wood I have. The posts are of iron, bolted into granite. If a man wants a stable to last his lifetime, this is the most inexpensive structure he can build. My experience with the horses in it is most satisfactory. I am rather a crank on horse shoeing, and I have found these moist bricks keep my horses' feet in most splendid condition.

Nothing is truer in the dairy world than that many a nickel makes a mickle, and the exquisite quality of the butter or milk is due not to the breed of cattle, but almost entirely to the food they get. I know of nothing that loses its aroma quicker than new mown hay. Expose it to the close atmosphere of the stable in the winter, and you will find that by pulling out a lock on the outside, it has absolutely no odor. It smells like so much excelsior stuffing. But put your arm away in and get some clover or early cut hay 18 inches back, and it is as fragrant and sweet as the day it was cut. Take a Jersey and feed her on meadow swale hay and coarse fodder, and you get a most inferior quality of butter, while if you take a cow that is not considered a butter cow, and feed her on fragrant early cut clover that has been cured in the shed, you will get in February a product like June butter. So, to properly preserve the fodder is a most important feature in the construction of your stable—to put it in such a place as is least exposed to any contaminating atmosphere. And I believe it is important to have the stables arranged so that you can use more or less whitewash. I believe in whitewash, and my buildings are always whitewashed twice a year—spring and fall. I use unslacked lime. I keep it on hand and spread it about my stables every afternoon dry. Then I also keep about half a hogshead of whitewash that is about the consistency of thick cream, and with that, diluted with water, my buildings are patched up every week or 10 days. You have no idea of the difference that will make in the cleanliness of the odor of your buildings. I use a little carbolic acid in my whitewash, and then to make it adhere, I put into a pail of whitewash half a handful of salt. That strengthens it.

Touching upon pig pens, I am gradually coming to the conclusion that the least shelter you have for your pigs, the better. I realize how the markets have changed within the last 20 years. To-day the pig that brings the best price and sells the most readily, is a pig farrowed in the spring—March, April or May—and that you turn off to the butcher in October, November, December or January; and if you can keep that pig out of doors—feeding him perhaps, if you have not got some clover or some good crop to feed on himself—and give him plenty of room, he will do better than any other way. When you do pen the pigs, the pens should be constructed so that the pig will have a bed. I do not agree with some of the older farmers that the pig is not a cleanly animal. I think he is an animal of the most enormous appetite and wonderful power of assimilating his food, and tremendous digestion; and I know from experience that he will always seek a clean corner of his pen for his bed. In making my pens, I always partition off a space for a bed, the partition being only five or six inches high, made out of chestnut plank. My pigs seek that bed, and will never drop their dung nor urinate in it. I have seen them, when wanting to urinate, get up deliberately and walk off outside of that little enclosure, and go into the main body of the pen and do it there. The pig pen should be constructed as simply as possible, and should be whitewashed at least once a month. As I told you, I use a good deal of loam as a disinfectant, and I take a great deal of pains in keeping my pigs well-housed and warm, and with plenty of bedding. The refuse of my farm, my coarse swaled hay, and my coarse corn stalks, are all run into a chaffing machine and cut into lengths of two or three inches, and my pigs are bedded into that. That is worked into manure and in the spring or fall, that goes into one of these manure spreaders, and is very well spread and easily harrowed in. I have an old fashioned arrangement by which my troughs are made half in the pen and half in the passage way. My pens are 8 by 10 feet for four pigs. There is a door that swings over the troughs in such a way that the trough is either in the alley-way or in the pen. The man goes down the passage way, and almost as rapidly as he can walk, rolls the swinging door on to the back side of the trough, shutting the trough out entirely from the pig pen, and then throws his food into this line of troughs. After every trough is filled, he goes back and swings the cover on the outside of the trough, and then the trough is in the inside of the pen and the pigs get at it very easily.

One thing more perhaps I might mention—my bull stall. I got the idea from Mr. Saltonstall. The stall is built 12 or 15 feet square, and then in the center of it there is put a post six inches in diameter, well fastened at the bottom of the stall. Then place a swivel about three feet from the ground, and in that swivel a ring, and tie the bull to that. The door and windows are arranged to suit your convenience, but the doors should be made wide. Your bull can at any and all times face you, wherever you may be, looking in at the window or the door. He has more or less exercise in going around that post, and I assure you if you keep a bull that way, I see no reason why he should ever become vicious. Many of our bulls become vicious through timidity—that is, they hear all sorts of noises and are startled, and they cannot see what it is, and get restless and show more or less spirit, and so become ugly and grow more savage every day. That is, I think, largely if not wholly due to their not being able to see what is going on about them.

Mr. Moulton: How do you fasten the bull?

Mr. Burnett: By running a chain around the horns, with a ring and a snap through this ring and running the chain right through the ring in the nose.

Mr. Moulton: How much leeway do you give him?

Mr. Burnett: So that the bull can comfortably lie down; I should think 2½ to 3 feet of chain. I do not think my swivel is more than two feet above the level of the ground. The bull gets around the post very handily and feeds without wasting his food. You would be astonished to see how quickly the bull gets accustomed to that position and will take his grain out of a box or will take his hay and eat it up entirely.

Mr. Rives: I have been very much interested in Mr. Burnett's account of the floor of his stable. Pavements even for cities have been always the greatest problems of the engineer, and I concur entirely in his views. While in England some years ago, I was at Eaton Hall, the country seat of the Duke of Westminster, and I found that all of his loose boxes for his favorite horses were paved, in the manner indicated, with bricks. They were a little improvement on our ordinary bricks because they were rather narrower and were a little more burned, giving a more perfect foothold for the horses; and people who have used these bricks have seldom had a horse strain himself in getting up. In England, there is an almost endless variety of tiles for the flooring of stalls, but the Duke of Westminster seems to prefer the bricks as presenting the most advantages. I believe it is the custom, in order to render the bricks non-absorbent, to pour over them a bucket of cement of about the consistency of butter milk, which before they become entirely dry can be scraped off of the upper surface.

Mr. Burnett: I did that, and I had occasion this fall, after five years continual usage, to take up one of the stalls in my stable and the bricks were so good that I replaced them.

Mr. Rives: I have had the same experience after 15 years, so yours will last a good deal longer.

Mr. George B. Post was the next speaker. He said: I am ashamed to say that after many years of practice as an architect, I have accumulated but a very small fund of practical experience in the matter of farm structures. About 16 or 17 years ago, I bought four farms in New Jersey which centered on a peculiarly beautiful building site with the idea that I would build a house at the intersection of the four farms, and at that time I had very magnificent ideas with regard to the farm buildings which I should erect. But on mature consideration, after having made the purchase, I determined that I would alter and improve one of the existing farm houses, and that I would remodel the old barn as a temporary measure, while I saw whether I liked the place and was willing to spend much money there. I have been adding to the house ever since; about every three years I have put a wing on it. The old buildings were built with heavy squared chestnut timber, enough timber in a line of sills to construct an ordinary modern barn. They are from 60 to 100 years old and, from all I see, they will last for another 60 or 100. Consequently, as I never built on the lot I intended to build on 16 years ago, and have never built any new barns, my ideas are simply theoretical. I have still visions of what I should like to do, and of what I intend to do when I do build on my proposed site. Although I have had but small experience in building structures for the care of stock, I have had a considerable experience in building structures for the comfort, convenience and health of the human race and, among other things, I have been forced in the course of my profession, to make a very careful study of hospital provisions—that is, the arrangement which for the human being served best to promote the ends of recovery from disease, or of general health when there was no disease. I have always thought that the same general principle and theory applied to stock must in the end produce the best result. When I build my farm buildings, I shall abandon all idea of having my cattle arrayed so that there will be a magnificent vista of Jersey heads and tails as you enter the structure. I shall select a southern exposure—a side hill—and I shall build a series of wards for my cows, horses and pigs; in other words, a continuous row of parallel buildings that will accommodate about 15 or 20 head of stock each, running north and south so that the sun will daily play on the east, south and west sides of the structures. I believe that, with stock, sunlight is as important as with the human being. During our war, it was proved conclusively in the field hospitals, that the patients on the southern sides of the hospital ward recovered in a much larger proportion from similar wounds, being in a similar condition of health, than those on the northerly side, showing how important the effect of sunlight on the walls of a building was in its hygienic properties. I shall build of brick or stone, probably stone, as it is plenty where I live and is therefore cheap. But if stone were not plenty and I could afford it, I should build of brick. The matter of moisture and dampness is very little understood. A single course of heavy Irish felt, preferably, or two or three courses of ordinary felt laid above the ground, will intercept all absorption by capillary attraction into the wall and will keep it dry. Water will pass through a brick wall with very considerable ease. You cannot build a better filter than an ordinary four inch brick flue laid up in lime mortar, but in practice water does not pass very much through brick or stone walls. A wall of stone or brick is an admirable conductor of heat, and when the temperature of the exterior air falls to such a point that the inside surface of the wall cools to the dew point, or the point at which the cold air is incapable of holding the moisture it contains, the moisture collects on the inside of the wall and rolls down exactly as it collects on the outside of your water pitcher on a summer day. This is readily prevented, and with very great economy, by a brick lining with an air space, or, still better, by a lining of the hollow brick which are made in large quantities in almost all our great northern and eastern cities at the present time. I should connect these buildings at the northerly end, as I would do in a hospital, with a corridor which would make a place for cleaning or cooking or keeping utensils or for the various uses which might be convenient in connection with the stable for any purposes for which it might be used. Between the buildings there would be yards that would be absolutely protected from almost any wind except a due southerly wind ; and on the southerly exposure there would be the ordinary farm barnyards, which might communicate or not at pleasure. Such buildings would not, perhaps, be handsome in an architectural point of view, but they would not be expensive to construct, and I am inclined to think that in a sanitary point of view, they would be very preferable to the great barns which I have examined. I agree entirely with the gentlemen who have already spoken, from practical experience, on the subject of the pavement of the floors with brick or tile. If it is desirable to make the brick non-absorbent, it can be done at a very trifling expense by heating the brick and dipping them when hot in hot coal tar, and the distance to which the coal tar will penetrate, will be in exact proportion to the amount of heat in the brick at the time it is immersed. Coal tar is very inexpensive, and bricks dipped in coal tar laid on cement mortar with a small proportion of asphalt mixed with it form an absolute waterproof floor. I do not think that floors are made at all more slippery, so far as my experience goes, by dipping the brick in the coal tar. My opinion is that ventilation would be as important to the perfect stable as to the perfect hospital, and that the ventilation as in the hospital should be as far as possible with the exclusion of all unnecessary draughts, and that this can be best accomplished by a large number of ventilating orifices or flues, rather than by one or two large central flues, as is very commonly seen in our stables. The difficulty of securing a draught in these flues is another matter. If properly constructed, I think the animal heat in most cases would cause a sufficient draught. I am inclined to think from the small experience I have had with stock—I know it is so with dogs, for I have paid more attention to the kennel of late years than to the cow stable—that animals kept in small numbers in a building are more healthy than those kept in large numbers. I think it would be the same with cows as with dogs, and I am quite sure it is the same with horses. With only a moderately small number of animals in a building, in case of any infectious disease, the danger of its spreading would be lessened, and the facility for isolation of the animals would be very much greater. All of these various views I hope one of these days to put in practice on my own place, and if I ever carry them on to completion it will give me great pleasure to show them to you. At the present time, it is a matter of theory.

Mr. George E. Waring, having been introduced, then said : I received your very kind invitation to be present this evening as a compliment to the length and tenacity of my memory. Going back over the experience of my life, after receiving your letter, I was able to recall the fact that early in the century, I did have some connection with agriculture, and that at that period I had a decided interest in the modification of farm buildings. But when I attempted to formulate my recollection and to gather my reminiscences into a great mass for presentation here to-night, I found that I should probably make a failure of it. It is so long since I have had anything to do with farms or farm houses or barns or fences, that I really hardly know what to say. In going about the island where I live, I see frequently from the roads over which I ride and occasionally visit, as Rip Van Winkle would have visited his old haunts, Ogden farm, with which I was for some time connected, and on which I built a barn. I think pretty nearly of that barn as when I built it. I have seen a good many others since, both here and abroad, but in material, in arrangement, in durability, in convenience and in healthfulness, I think it still answers pretty well the purpose for which it was planned. It is what is called a three story barn on an artificial side hill; that is to say, it is built on level ground with a drive-way into the cellar or manure pit, and another drive-way up a grade road to the hay floor. These three floors are absolutely cut off from each other. Originally, I adopted Mr. Mechi's plan of making the stable floor of open slots, so that the manure should be pressed through or easily worked through to the cellar, but I gave that up after a short experience, and depended upon holes through which to throw it. The cattle stood in two rows, facing a central alley only eight feet wide, and having a railway on which there was a car carrying their food. The partitions were low enough for the cows' backs to be seen—the small-sized Jerseys—and their heads also from the alleyway of the barn. They were tied by chains. They were fed from the floor in front of their permanent stanchions, and they were watered from box troughs of iron connected with iron pipes in front of the stanchions. The hay was stored in one large room on the floor above, entirely cut off from all communication from the stable, so that the hay was not at all affected by the ventilation of the cow stable, which was carried to the roof independently. As I say, the whole arrangement was very satisfactory, and I think remains so to this day. That barn was on the ground floor, 100 feet long and 40 feet wide, and on the hay floor 80 feet long and 40 feet wide. Its length was from east to west. Connected with it, running 75 feet to the west, was a row of box stalls with a straw shed over it; and 75 feet south from the west end was another which served the purpose of a wind-break. The foundation was of solid stone masonry, not of a fine character; the timber was all sawed spruce, the largest sticks being eight inches square. The barn was shingled on its roof and sides with cedar shingles and was coated, when first built in 1867, with petroleum, in which some form of red earth paint was mixed. It has not been touched for any purpose from that time to this, now nearly 22 years. All its lines are perfectly straight, its roof sound and tight, every stick about it as sound as when it was put in, and there is no reason why it should not stand yet for a very long time. That is practically the extent of my experience in farm buildings, but I have had some observation of farm buildings of two different characters since that was built. The first was when I visited the land from which all of our forefathers came—Holland. I found there the most remarkable structures, the most picturesque in some respects, the most convenient, and altogether the most attractive of any that I have ever seen—barns of an enormous size, built out from the rear of the family residence and literally in connection with it, though not in such a way that the rooms of the house were at all affected by the atmosphere of the barn, with huge great roofs of thatch or slate or of red tiles, and with the cow stables always rather more a part of the house than a part of the barn; that is to say, from the sitting-room of the house, where the farmer is proud to pass his time, the opening into the stable is through glass doors, where you have the full view of the heads of the row of cattle down both sides of the central passage way. I have never seen these stables when they were occupied at winter time; I have only been there at the pasturing season, and then there was adopted a device which was particularly attractive, and which might be adopted in fancy farming here. The platform on which the cows stand, as soon as they go out in the spring, is covered with sand raked down to a smooth surface, and laid with beautiful old tiles, and the whole stable is whitewashed and ornamented with polished brass dairy utensils, and made to look generally like an ornamental room of the house rather than a practical stable. The other class of farm buildings, to portions of which my attention has been, from time to time, attracted, are a sort that are seen, so far as I know, only in this country—a class of barns that are very much more expensive, very much more highly finished, very much less like barns, and more like palaces, than it seems to me is quite appropriate for such a humdrum, practical, every-day working business as farming. And I hope it will not be regarded as out of place if I give expression on this matter to my individual views, which, perhaps, are quite different from yours—that one of the useful purposes which you gentlemen can perform for the agriculture of the country, is to show not how much money you can put into your agricultural operations, not how much finer you can make your farm buildings than are the farm buildings of the ordinary farmer, but how good results you can get, how much attracriveness, how much agricultural success you can get by adapting to your uses in a simple, and, as far as possible, an inexpensive form, the processes and methods of construction that are suited to the average farmer of the country. I think that useful though your example might be in any way in which you choose to exercise it, it will be more useful and more permanently satisfactory, even to yourselves, if the fancy element is reduced to a minimum, or is confined, perhaps, to elaborate dairies or some ornamental item of the work, while the general business is carried on in buildings, which it is within the means of good prosperous working farmers, who depend on their lands for their livelihood, to adopt.

I have listened with great interest to the remarks that have been made already, and agree with everything that has been said with two possible exceptions. One is with regard to the stabling of bulls. I always kept my bulls on the line with the cows, held with a strap round the neck, patted and talked to, and slapped and knocked about, and handled precisely as the cows were from the time they were calves until they were turned out old bulls of seven or eight years old. I did that with quite a number of bulls, some of which after they left my hands became very vicious, but I never had a vicious bull on the place. I never allowed a bull to be struck or beaten, or knocked about or frightened, but they were kept in a conspicuous position, where they saw everything that was going on, and they made no more of a man than a woman. The other question is that relating to the pavements of stables, and in this I refer especially to horse stables. Remembering a large stable on the line between New York and New Haven, with which I was familiar when I was a boy, and where there was a very good lot of stage horses kept, and seeing one or two English works on the subject of the shoeing of horses' feet, I was disposed to adopt the ideas suggested by Mr. White in his book, and go back to this old flooring that I recollected, which was well laid, small-sized cobble stones. About three years ago, I took out the floor of my stable, where I keep three horses, had it filled up with gravel and sand, and well paved with small, half-worn, cobble stone pavements that I bought from the city. Two of my horses I took the shoes from entirely three years ago last September, and one of them has never had a shoe on since. But since I put that in, I have had good frogs, good feet; I never had a slip, never had a strain, although I am a heavy weight and ride fast and hard; I never have had any trouble with their pasterns or knees; nor have I had a splint since I treated them in this way. I believe there is no way by which you can bring so direct and useful a pressure on the horses' feet as by the use of cobbles. You cannot get that on a laid brick floor. When standing in the stable, the horse will get a little to one side or the other of the stone, and in that way will strengthen and exercise the side tendons; and I attribute to that, and I think with good reason, that since I have stabled my horses in this way, I have never had trouble with them. Never before did I know horses to stand so secure in the stable. A horse in there for a month seems to get in better condition so far as the feet are concerned. It is not nearly so handsome as brick, but I believe it is better.

The "Farmers" then adjourned.

# The “New York Farmers”

MET again on February 28th, 1889, at the Hotel Brunswick, Mr. Francis R. Rives presiding.

Mr. Rives announced as the topic of the evening “The Pleasures and Pains of Farming,” and introduced Mr. Chauncey M. Depew, who spoke as follows:

Gentlemen: I had supposed that I should have listened to the orator of the evening before I would be called on to speak. I understood that my friend Professor Everett was the special guest of the club to-night for the purpose of giving us, as only a theorist can, a history of that of which he knows nothing practically. He is here, I know, with a prepared oration in his pocket, committed to memory, on the subject of the evening, and he can speak upon it with a brilliancy and force which none of us real farmers can hope to emulate. If there is any one thing more than another that the gentlemen about this table understand, it is the pleasures, the penalties, and the pains of farming. I have been a member of this society, as the chairman knows, for 10 years. Last summer, at Chicago, I was presented as a candidate for the presidency of the United States as the “Grangers’ Friend.” But I had failed before going there to receive a certificate from the president of the club that I was a farmer; and the result was a libellous charge was made that I was a corporation and business man, and I was defeated, and possibly the most brilliant chapter in the history of the American Republic has been lost alike to the present and to posterity.

Agriculture is the basis of the purity of our institutions, and it furnishes the virtue, the brawn, the sinew, the intelligence which constitute the possibility of the existence of free institutions in this country. But as for the pleasures and pains of a farmer’s life, there are very few about this table who know anything about them. When I was a boy, I knew something of what a farmer’s life was, and precisely what its pains and pleasures were, and the fact that I appreciated its pains more than its pleasures has made me all that I am. If I had stuck to the farm, I should have probably been still living in the ancestral home, feeding upon things that I did not like, and longing for the fluids which I could not get, adding a deficiency to my income each year, and leaving a mortgage on the place to my posterity. But the pains of the situation impressed themselves upon me to such a degree that I am what I am, and posterity will be entirely satisfied when the time comes to inherit. In making that last assertion I do not intend to reveal to the speculators about this table any point upon which they can invest upon a margin and realize what is not legitimately their own. But it would be something for the poet or the essayist to develop, if they could see these farmers here enjoying the pleasures and pretending that they did not appreciate the pains of the farmer's life during the season when they are practical farmers. Of all the men about this table there is none so distinguished, none so venerable, none who by name and ancestry, and his own active and patriotic and intelligent and able exertions, has impressed himself so much upon the country as my friend Mr. Jay. If you should see Mr. Jay cavorting in a wild and hilarious state up and down Fifth Avenue, you would immediately turn your head away and run to the nearest court, and have a committee appointed for the care and custody of his person and estate. But when you see him, as I have seen him, upon his estate at Bedford, taming a young colt, and being careered by that colt in a wild and hilarious condition around his farm, it will seem to you, as it did to me, to be the "eternal fitness of things."

I remember when Theodore Parker delivered that wonderful oration upon Daniel Webster in which he at once destroyed his reputation and magnified his intellect, and in which he presented to the world a picture unequaled by anything except Milton's description of the fall of Lucifer, and I think quite equal to that, that there was one feature of the presentation, one phrase, that so impressed me that I have never forgotten it—"that Webster, in the superiority of his intellect to all the men with whom he came in contact, in the grandeur of his nature which rose above all the environments of the senate, the cabinet and the courts, felt at times that something equal to himself was necessary for the existence of the grandeur of his personality, and when that mood came upon him, he retired to his Marshfield farm, and there communed with nature," and as Parker put it "in the breath of healthy oxen, he felt himself at home with the best of the creations of the God who had created him." Now, we are none of us Websters, and so we do not retire to the country for any such purposes, and if we did, our eulogists would not present it in that way.

I was born on a farm up here on the Hudson, upon which my father and my grandfather and my great-grandfather and my great-great-grandfather were equally born; and it has been my lot to note the business man of New York, who usually originates in New England and comes down here with a sharper intellect and a keener apprehension of affairs than the native Knickerbocker possesses, cheats him in some way out of his patrimony and enters into the possession of the estate, and at about 60 years of age makes up his mind that he will retire from business, buy an estate on the Hudson and enjoy life. The first year, he makes fences, he erects buildings, he propagates stock—something of the fire of youth comes to him in all these exercises and he begins to feel that once again he is on his New England hills with all the original vigor that belonged to him before he had anything to speak of. The second year, he thinks this sort of thing is getting a little monotonous and he eats and drinks more and gets dyspeptic. The third year, he takes peptic medicines for his liver; and the fourth year, a funeral procession marches over the hills and his heirs divide the estate.

If there is any one thing more than another that I enjoy in midsummer, it is to see Sam Sloan in his shirt sleeves, and with his suspenders hanging down his pantaloons endeavoring to reduce a Putnam County farm to the conditions of modern agriculture, while he guides a plow over the fields. You, gentlemen, never have seen that; if you had, you would never have purchased Lackawanna stock. I passed him one day and I said, "Sloan, how do you like this sort of thing?" Said he: "Depew, you don't know the pleasures of a farmer's life," and as he raised his horny hand of toil, I saw that there was in him the stuff out of which was created the fathers of the Republic.

Those of you who practice farming on Fifth Avenue and plow in Wall Street and pursue your pleasures under conditions which become no part of the family biography, do not thoroughly understand the farmer's life. But men like Jay and myself, who were born in the country, know what it is. I remember that my father, and he was typical of all that old Huguenot Dutch stock along the Hudson, labored under the impression that no boy would amount to anything if he slept in a room in which there had ever been a fire, and I used to awaken under that theory of my paternal and beloved ancestor every morning with my breast frozen to the cover. It was not because there was not plenty of wood on the estate nor because stoves were not cheap, but because the old gentleman had that theory that the only fellows worth living in this world were the men who could survive hardships of that kind and the survival of the fittest constituted the preservation of the Republic; and when I came down in the morning sometimes, with a complaint, which was not mild, on the situation, he reminded me that at Valley Forge, the soldiers of Washington endured far greater pains and the soldiers of Washington had made it possible for this Republic to exist. Now I sleep in a house where the furnace permeates it under every condition, and I bring my boy up to the same surroundings and experience as mark my own life of to-day. He has his heated room, all the appliances of comfort and of luxury; and I sometimes wonder whether my father was not correct. I sometimes have misgivings whether that boy, if the exigencies and perils and defeats and disappointments of life meet him, will rise to overcome them, and I have about come to the couclusion that the conditions which the American farmer throws about his off-spring, whether they be of necessity or whether they be, as they were with my father, of theory, are the conditions which create men who will in the future control the business, manage the politics, direct the statemanship and hold the government of the Republic of the United States.

Dr. Wm. Everett, of Quincy, Mass., then said: If I gathered anything very distinctly from the address of your member who has preceded me, it was that he was very much disappointed that I had not been called upon before him, and that it was essential for the true success of his speech that

I should have spoken first and been put up, and that then he should have knocked me down. I believe that is entirely correct. I believe that some one has got to get up and state what is the true line of operations in order that Mr. Depew may know what to do and how to make his speech. Your subject is the pleasures and pains of a country life. I know nothing of that because I am a city boy, out and out. I was born in the country, but was moved into a city before I was conscious, and have lived in a city almost all my life. I am obliged, therefore, to go back to my ancestors and say what they knew about a country life. My grandfather, on the mother's side, was a man who understood the pains and pleasures of a country life to their best. He had inherited an extensive farm that had been given to the first man of his name by the Indian grants, and it had come down unbroken to the oldest son of the oldest son ever since, which is a rare thing in this country. He found himself, when he was 16 or 17 years old, with nothing but this farm, and that in Eastern Massachusetts, where the chief productions of the soil are ice and shoes and salt fish, was very little. But he went into business, and gradually found greater and greater opportunities until he had, as a city man, made something of a fortune. When he was but little over 40 years old, he found himself in possession of a large and rapidly increasing income, and recognized as one of the most successful business men of Boston. But he then deliberately retired from active business, taking the position that it was best for a man to stop making money when in the full tide of it, and became known for the greater part of his life as a quiet country gentleman. He went back, at less than 45 years of age, to the acres that he had inherited from his fathers and settled down under the shadow of the trees that had seen John Winthrop come to Massachusetts. He thought that the fields of Medford were a better place for a man to live in than the streets of Boston, if he wished to be brought at once in communion with nature, with man, and with God. But, on my father's side, I am the son, grandson, and great-grandson of men who have been in what are called the learned professions, and I have no claim whatever to be a country boy. When you invited me here to-day, I remembered your information of two years ago, that it was distinctly understood that whatever might be the subject of the evening, the invited guests might speak on whatever subject they could. I have debated a good deal in Boston and in coming on here what I should talk to you about. There is farming—you know everything about it and I know nothing at all; that would not do. Then I fell back on my own profession. I am a schoolmaster. About that I know something, and you know quite as much as I do because you have had boys to educate. Then the next theme that came up to my mind was politics, in which I am interested. But some of you are devoted Republicans and some are devoted Democrats and I am a Mugwump—and it would be no good for me to talk about that because none of you on either side agree with me and you would pull me to pieces between you. And then I was forced to throw myself into the world at large and consider if there was any subject upon which it was worth while to speak to you which was of general interest to everybody. My mind went back through the last year and it occurred to me—had anything happened lately wherein without any question of party, without any possibility of striking on something about which men may differ among each other, I might say a word to bring you to realize something great, good and worth knowing and thinking about? Gentlemen, do you realize that in the last year there has passed away from this world one of the greatest and best men it has ever seen and that we have taken very little note of it? Do you realize that while we are talking of the peculiar questions that affect us here and now, we have seen move among us and rise and culminate and set one of the brightest stars the world has ever known? The world, particularly the American world, has taken little note of him, and, perhaps, as I speak, you may not know whom I mean. Why should I adopt this serious tone on an occasion which is one of festivity and ease? Yet this is a thing which has taken hold of me, which has affected my life and my thoughts for many months more deeply than you can easily imagine; and I ask you with all seriousness to note that in this year, this year which commemorates the centenary of Washington's inauguration, we have lost from the world the man who since Washington appeared, has set the brightest example to the rulers of nations of how Washington's principles should be carried out. I am amazed that the world should be so insensible to it, that it has taken so little account of it; and I determined before this assembly of cultivated men, of men who have leisure to think, and who are not occupied by the cares of this world as most of their brethren are, to ask you to take note of the career and the life and death of the Emperor Frederick of Germany. Here is a subject on which I feel there need be no dispute nor discussion. The Emperor Frederick was brought up as every crown prince must be, in a difficult, narrow, and troublesome position. He was forced by the traditions of his house to make himself a soldier, but he hated soldiering, he detested the idea of being a warrior, he would have chosen any profession except that which declares that the best use you can put a man to is to kill or be killed. Yet, in obedience to the feeling of his nation which, contrary to his own conviction, declared that the profession of arms is the highest a man can adopt, he served in the army from the beginning to the end. He even made himself a perfect general of the second class, and if he was not a general of the first class, it was simply because he had no opportunity to be so. He did all that his profession called on him to do to the height, yet he showed that if he had all the virtues of a soldier's life, the discipline, the courage, the daring, he had none of its vices, none of the narrowness, cruelty, and disregard of the highest ideas of progress and humanity. He was such a soldier and such a general, that not only all of his own nation admired and loved him, but the very nation against whom he fought also admired him as a gracious and generous conqueror. He married one of the noblest women that ever lived, a woman who inherits all her mother's virtues and all her father's brilliant accomplishments. He maintained in Germany a subordinate position. He submitted to be the dutiful son of his father, although his father's ideas belonged to a past age and his own belonged to a future age. Yet he was able to do something, though but a little, to carry the glorious nation to which he belonged a little further in the path of progress than his father's counsellors were willing to allow. Gentlemen, think what the sons of kings generally are! Think what their temptations are!—and then remember that the son of the Emperor William never yielded to one of the vices that even private men usually yield to. Then a cruel disease, a disease to which any man here would have succumbed, and would have been excused for succumbing, carried him to the softer airs of the Mediterranean. From that coast he was summoned by the news of his father's impending death. He had not only an excuse but a good reason for staying in Italy, but deliberately in the winter he crossed the mountains and went back to the infernal climate of Berlin, because duty told him to, and like a faithful son he stood by his father's bedside, though he knew he was driving the dagger into his own throat by that action. His short reign succeeded, a reign of 90 days, 10 days shorter than Napoleon's when he came back to France in 1815, and yet he succeeded in putting Germany a little ahead in the path of liberality and freedom; in planting one more barrier against the reactionary policy of his father's advisers, and when he might have yielded not only to the ordinary temptations of kings, but to the extraordinary temptations of suffering humanity, he discharged the highest obligations of the highest duty to the very verge of the grave. I ask you, of how many men that have lived in the world can you say the same—that they did everything that they were called upon to do as well as it could be done—and that can truly be said of the Emperor Frederick. I feel this:—in 1789, Washington was made president of the United States, and it is true of Washington that he performed every duty that ever devolved upon him in the highest manner in which it could be done; and in 1888, there passed away a man, not a citizen of an independent colony, not a child of free institutions, but the son of a monarch, a child of despotism, who equally performed by Washington's standard—and what can be higher!—every duty as well as it could be done. It seems to me that we need not yet despair of human nature, and that if a hundred years after Washington we have had Frederick, the human race has not gone backwards, and that we should congratulate ourselves that we have lived in the same year with that man. The lesson that impresses itself upon us by the example of the Emperor Frederick is that every man should do in his own line what can be done to the best of his ability. If he is a farmer, it is his destiny and his duty to raise the best crops which the soil under the best manure can produce; and it is the duty of a schoolmaster, like myself, if he has boys in his charge, to educate them to the highest standard of humanity. Nor should we forget that the development of the true nature of man is based alike on the facts of society and the fact of solitude—that a man must mix with his fellowmen if he would forget himself, if he would cease to consider himself as the whole world, and on the other hand he must go out in the country and out of the sight of his fellowmen, if he would understand clearly the dignity of his own existence. By properly combining the intercourse with the fields and woods with the intercourse with his fellowmen, then and then alone can a man attend to the true performance of the two great commandments, and while he loves with all his heart the God of nature, can learn to love also his fellowmen, without intercourse with whom he is as useless as a stick or a stone.

Mr. John S. Barnes then said: When I had the pain or the pleasure of suggesting this topic, I had a sort of opinion that it might be an opportunity for some of us novices in the art of farming to say what we know or did not know on the subject. For myself, I have listened with great veneration and respect to the spoutings of wisdom which we have heard at our dinners here on the subject of the various branches of practical farming, and of farm buildings, and the feeding of the stock and the methods of taking care of them; and I have endeavored on my own little farm in a feeble way to put into practice some of those theories which have been presented, and to digest as well as I could the theoretical and extrinsic problems which have been spread before these meetings—and always with some pain. But I never took much pains with my farming. I do not know why I became a farmer. I suppose it must have been a latent instinct within me. My earliest experience was not upon a farm, but I remember the first evidence I had that a cow gave milk. I was walking up a road in Vermont ahead of a stage, when I came across a cow by the side of the road, and a young lady sat by the side of the cow. I thought myself rather a sort of a good looking fellow at that time, and I brushed the dust off my coat and stepped up to her and asked what she was doing. "I am a milking," replied she, "do you want some?" and with a dexterous turn of the wrist she purged me of my spirit of inquisitiveness, and I never asked a question about farming again until I joined the Farmers. Later in life, when I had a few dollars to spare, I bought a farm. It was a rather hard looking hundred acres, filled with stones, and with a very thin and tender soil. I built a barn on it and looked around for advice what I should do with it. The first advice I got was that pigs were rather a good thing to have on a farm, and I bought one, and in a few weeks I had a dozen, and I kept those pigs for a while, and finally the gentleman for whom I work down here, and who manages my farm up there, said he had sold those pigs, and I was greatly pleased when he placed in my hands $48 —mostly, I think, in one and two dollar bills. I went up to the village and bragged of my success as a farmer, and while I was telling of it, a person presented to me one of those deadly instruments of torture with which you are all familiar—a subscription book—in which I had written my name down with $50 opposite it, and he asked me to pay it, and I handed him the $48 and $2 added to it, and I said, "there goes my litter of pigs." That was one of the pains of farming. I made up my mind that perhaps it would be well that I should get some pigs that I could not sell and I succeeded. A friend of mine, who thought that he was going to do me a benefit, although I had never done him any harm, presented me with a small Yorkshire boar, whose facial expression was best represented by a plank with two holes. I originally bought pigs from a manure standpoint, because I could not carry on a farm which was run down without manure, and manure could not be made without pigs. Then I thought the southern style of pig would suit me—the style which they say is the best for that climate, because no pig is worth anything there unless he can beat a negro running. This one I got had no legs to speak of, but he had a long pedigree, and I believe his grandfather cost $2,500, and I have got him on my place still, although he has to be assisted to rise and has to be held up when he eats. So far as I can find out no farmer in my vicinity will have him anyhow, and so I am relieved on that point of selling pigs and giving away the money. I have listened to the theories advanced here, and I have learned all I really know about farming at this table. I have tried the different forms of fences advocated here, and I have found in the spring that the frost scoops them all. I have sunk miles of drains on my farm because I have been advised here to do so, and they burst out and cave in and the water does not run through them, and they do everything but what they ought to do. I have tried to tie my bull up in the various methods suggested. I have tied him by the nose with a collar round his neck; I have put a collar round his heels; and I have given him the advantage of a large domestic circle; but he still knocks the skylights out of the attendant, and I am afraid to go near him. I have been told here that ensilage will do for feeding stock, but I have never yet been able to make my mind up about it, because at the next meeting of the club some man would get up and say it was poison. So I have drifted about in these uncertain pools of knowledge displayed before us until I have got into a sad state of perplexity, and I am yet wondering, and I do not yet know what to do with my cows or my bull, or what kind of pig to raise. I have also tried to raise chickens, and I have tried to find out the best kind of chicken to have, and I have had long lists of chickens placed before me and much advice as to the best feed for them. When I first had chickens they roosted on doors and all about the place, and I had more eggs and more chickens than I knew what to do with. But by the counsel of some experts I built a chicken house and heated it with steam pipe, and I gave them a parlor and a sitting room and every advantage, and yet I see those chickens, some of them without feathers, standing on one leg and doing nothing—and I buy eggs at 75 cents a dozen. That has been my experience with chickens.

The yokel who drinks, who starves your cattle, who wastes your substance, who gives you impudence, and whom you discharge to-day and take another one on the next day fully as bad; the potatoes which rot, the corn which blights, the hay which spoils, the blighted pasture, the failure of your crops, your prayers for the rain which comes not—these are pains of which you all have experience. But cast them all aside and step out in the bright and sunny morning and walk over your grassy fields, and see your growing crops, and listen to the lowing of your herds and the bleating of the sheep, the love song of the birds on the trees—your open window, the free wind, the eager faces anxious to be out in God's own sunlight—and you will suffer all your pains for the pleasure of the peace and the calm of the country life.

The "Farmers" then adjourned to Thursday, December 19th, 1889.

# Proceedings

of the

# New York Farmers

SEASON 1889—90.

---

PRINT
GLOBE STATIONERY AND PRINTING CO.,
89 Liberty Street,
New York.

## MEMBERS.

Mr. Daniel F. Appleton.
Mr. John S. Barnes.
Mr. Fred Billings.
Mr. Frederic Bronson.
Mr. George H. Brown.
Mr. James A. Burden.
Mr. George F. Baker.
Mr. LeGrand B. Cannon.
Prof. Charles F. Chandler.
Mr. Joseph H. Choate.
Mr. Smith Clift.
Mr. Samuel J. Colgate.
Mr. Alfred B. Darling.
Mr. Chauncey M. Depew.
Mr. Henry J. Davison.
Mr. Theodore A. Havemeyer.
Mr. Robert Hoe.
Mr. John J. Holly.
Mr. Adrian Iselin.
Mr. John Jay.
Mr. Charles Lanier.
Mr. J. Lawrence Lee.
Mr. Johnston Livingston.
Mr. Pierre Lorillard.
Mr. James Lawrence.
Mr. J. Pierpont Morgan.
Mr. J. G. McCullough.
Mr. Levi P. Morton.
Mr. Gilman S. Moulton.
Mr. James Otis.
Mr. George B. Post.
Mr. Percy R. Pyne.
Mr. Francis R. Rives.
Mr. Archibald Rogers.
Mr. F. Augustus Schermerhorn.
Mr. Samuel Sloan.
Mr. James Stillman.
Mr. Thomas Sturgis.
Mr. Rutherford Stuyvesant.
Mr. Walter L. Suydam.
Mr. Jonathan Thorne.
Mr. Henry A. C. Taylor.
Mr. Samuel Thorne.
Mr. William K. Vanderbilt.
Mr. Cornelius Vanderbilt.
Mr. W. Austin Wadsworth.
Mr. John Hobert Warren.
Mr. W. Seward Webb.
Mr. John D. Wing.
Mr. Herbert Wadsworth.

### COMMITTEE ON NOMINATIONS FOR MEMBERSHIP.

Mr. LeGrand B. Cannon.
Mr. John D. Wing.
Mr. Frederic Bronson.

* * *

## OFFICERS.

President, - - - Mr. FRANCIS R. RIVES.
Vice-President, - - Mr. JOHN JAY.
Sec'y and Treas., - - Mr. JAMES OTIS.
Address of Sec'y and Treas., No. 22 East 10th Street.

Reported by CHAS. P. YOUNG, 32 Nassau Street, N. Y.

a-9-2972

# The “New York Farmers”

HELD their first meeting of the season of 1889–90 at the Hotel Brunswick, on December 19, 1889, Mr. Francis R. Rives presiding.

Mr. Rives, in opening the proceedings, said: Gentlemen—The subject selected for discussion this evening, “Country Roads; their Construction, Improvement and Maintenance,” is one the importance of which can hardly be over-estimated. Country roads are the indispensable feeders of all railways and of all steamers. On the first introduction into England of steam as a motor, it was thought that draught horses would soon become comparatively useless. But in a short time it was discovered that more horses were required to carry passengers and goods to and from the railroad stations than before had effected the entire transportation of the realm.

The pluvial phenomena, to use a phrase of the meteorologist, and the hygrometric richness of the atmosphere, during the past two years has attracted the attention of the country as never before to our subject for discussion. The Governors of the great States of Massachusetts and Pennsylvania have recommended the revision of the road-laws. Bills to the same effect have been introduced into the legislatures of New Jersey and other States. The popular magazines, notably Scribner’s, The American Economic Association, The Carriage Builders Association and The Bicycle League, have all taken up the topic; and, by the way, The Bicycle League have issued a very good and instructive pamphlet on the subject of the improvement of roads for their machines, which pamphlet they will gladly circulate.

There is manifest a slight disposition to invoke the paternal aid of the general government as well as of the state governments. But, while the improvement sought is certainly very desirable, it would seem that a better administration of the law as it exists is more to be desired. In reference to road laws, there is abroad a good deal of the sentiment that is so happily expressed by a citizen of Maine in regard to the prohibitory law, who said that he “wholly approved of it, only he was entirely agin its execution.” What we most want is a strong public opinion and a correct spirit in regard to carrying out the intents and purposes of road laws.

Bad roads are the most burdensome and multifarious form of taxation.

It has been estimated that they impose an annual tax of at least $15 on every horse. They tax also the vehicles, the harness, the clothes, the time, the labor, as well as the tempers of all the people. They detract from the value of lands, which are dependent upon them for access to markets.

It has been said that the history of roads is the history of civilization. If this be true, as it undoubtedly is, of other nations, there are parts of our own country, not very remote, which are indeed in a state of deplorable savagery. A distinguished French traveler met in this country on one occasion Judge William Kent, who asked him what he thought was the most dangerous country that, in his numerous journeys, he had ever visited. With promptness he replied, "Certainly Broadway."

It has been my fortune to be for a good many years an Overseer of Highways in the County of Dutchess, although I was one year ignominously bounced, for partisan reasons; but, without solicitation on my part, I was restored the next year. From my experience in that office I have managed to pick up a little empirical smattering on the subject and have come to the conclusion that it is an important qualification of an Overseer of Highways and of a Commissioner of Highways to be able at least to read and write understandingly, and that he should be sufficiently forehanded to devote his time to the duties of the office which he fills—or intends to fill—with zealous fidelity.

The width of a road-bed I have concluded should be at least thirteen feet, although I have seen in the vicinity of Chatsworth, in England, a very fine road-bed which was only eleven feet wide. An excess of width beyond the requirements of the road seems to be undesirable. The best road, I believe, all the year round, year in and year out, and every day in the year, is made by placing quarried stone laid on edge lengthways across the road, with a slope from the centre to the sides, covered with broken stone—MacAdam—and having over that a larger if not over-coarse gravel. The addition of the gravel, where the expense of a steam roller cannot be met—and unhappily they are expensive, costing, I believe, about $5,000 apiece—quickens the bedding and tends to save the horses feet from injury, while it is also advantageous as a protection to the tires of the vehicle.

Then there are places where under-drains are absolutely indispensable. My experience teaches me that drainage should be effected by tile pipes or stone culverts, and not, on any account, by wooden culverts, which so quickly decay.

In the repairing of highways I wish to call attention to one very reprehensible habit which seems to have become general among our people, and that is the plowing up the side ditches and then throwing into the centre of the road the accumulation of silt and dirt; and, asthetically, this is a double abomination.

Another most objectionable practice on the part of our countrymen is the liberty they assume of making a dumping ground of the public highways, and throwing on them all the rubbish, filth, offal and slops that are peculiarly offensive on their own premises.

The plan of working the roads but once or twice a year seems to me to be the result of mistaken judgment. The effect is to overwhelm the road alternately with mud and dust. To maintain a road in good condition requires the expenditure of continuous labor. A diffusion of labor, therefore, is much the wisest. The proverb "a stitch in time saves nine" applies here with peculiar force. The experience of our boyhood teaches us that it is the nature of all cracks to widen. So it is with mud-holes. They widen and deepen with time, but in their inception they can easily be stopped. I have seen one, which had attained the dimensions of a serbonian bog, filled with a load of corn stalks, when stone and gravel were not only abundant but most accessible.

A correct idea of country roads, it seems to me, should be such roads as we find in our own Central Park, whose experienced and able superintendent we have with us to-night. It is well to have an ideal, even though you cannot attain it; and I am sure if we follow at a distance the example before us we shall be amply rewarded. If the roads in Central Park are not wholly beyond criticism, in my crude opinion, it is simply because the muddy detritus is not quite often enough removed in this phenomenal season. If Mr. Parsons can teach us how to get both good and cheap roads he will be the greatest of benefactors. For my own part, I have been trying all my life to get things good and cheap, and have not yet succeeded. I have the pleasure of introducing Mr. Parsons.

Mr. Parsons delivered the following address:

Mr. Chairman and Gentlemen—In accepting your kind invitation to offer a few suggestions to-night on the best way to construct and maintain highways and private roads, I fully realize that I must speak of matters with which most of those present are familiar.

In arranging and constructing their country places many have doubtless experienced a number of the difficulties of our subject, and in a greater or less measure learned to overcome them. I will not therefore undertake the exposition of any general system of road making. For the treatment of our subject in this manner, I would respectfully refer my hearers to sundry books to be found on the shelves of many well furnished libraries.

If you will allow me to take a somewhat homely method of explaining myself I think I will employ for the purpose two practical illustrations. This shall be, in one case, on the Hudson and in the other on the seashore. For obvious reasons we will not mention names, although I will say that the results obtained have been highly satisfactory to both the owners of the places and their friends.

We will take the case of our first illustration, the gentleman's estate on the Hudson. The place he bought and undertook to improve had been a gentleman's country seat for at least a generation. Large shade trees, American elms, etc., bordered the highway, and masses of evergreens, inside the fence, shaded the sidewalk. The branches of the road shade trees interlaced their foliage with the lawn evergreen and other trees, and the sidewalk was consequently wet and gloomy, and the grass over-run by moss. On the highway itself, the road-bed had fallen into decay and pools of water appeared after every rain. The large elms were planted twenty-five or thirty feet apart, and by their excessive shade tended to increase the wet undrained condition of the roadway. Along the private road grew rows of alternate Maples and Norway spruce. Gloom and shade pervaded everything, and moss grown grass and moist, disagreeable foot and wheelways met the visitor at every turn.

The new owner of the place was a man of decision and practical common sense, and as a proof of this the first thing he did on taking possession was to set to work cutting down trees in the most radical fashion. He was a lone man, so could commit this ruthless act. If there had been ladies about the place at the time, I doubt whether their kind and sympathetic hearts would have endured the threatened loss of such beautiful trees. But, jesting apart, his work of cutting was, in reality, based on the sound maxim that a tree ill placed is worse than no tree at all. Trees came down by the hundreds until those remaining in no case stood nearer than fifty feet apart. This havoc extended all along the borders of the fence, and along the private roads and walks, and over the lawns. None of the larger growing trees, such as Elms, Maples, Lindens, etc., were planted nearer than fifty feet apart, and the Norway spruces were nearly all cut out. This fine tree does not thrive under ordinary conditions over twenty-five years in this climate; and on the place we are considering the spruces were so deformed by crowding that in any case it would have been necessary to cut most of them out.

All objectionable trees having been cut away, or, rather, grubbed out, the next thing undertaken was the re-arrangement of the roadway and sidewalk spaces. The roadbed itself was about thirty feet wide and the sidewalk about ten. An improvement was made in the sidewalks by setting back the fences ten feet on either side—(the owner of the place never would take them entirely away)—but the roadbed, though somewhat scanty, remained the same, on account of the fine old trees growing on the borders. I may remark here that it is, in my opinion, a mistake to lay out wide roadbeds in village and country districts. They simply become, for the most part, grass grown for want of use. The extreme limit of forty feet would apply to most roads of this character throughout the country. But the question may be properly asked at this point whether it would be legitimate landscape gardening, as well as a practical system of roadmaking, to vary the width of the roadbed in order to save some attractive natural object, such as a tree or boulder. My answer is to point to one of the finest specimens of White Oaks about New York, growing at this moment in the middle of a main street in Flushing. The wheel tracks pass readily on either side of this tree without injuring either tree or sidewalk, and the roadbed is certainly not over forty feet in width. Let us, however, return to the highway of our country place, and its undrained surfaces. A plow was first employed, and the entire surface of the road, gutter and all, broken up. A regular grade of descent was secured, and in no case less than one foot fall in a hundred feet allowed. The surface of the road itself was carted away until the crown was about a foot or fifteen inches below the level of the sidewalk. On this surface was laid a foot of so-called rubble stone, with a lot of finely broken bits on top to fill up the chinks. I do not propose to discuss the respective merits of rubble or Telford pavement for roads. The truth is that either method offers a reasonably satisfactory way to secure good road drainage. I think, however, you will find a foot of broken stone sufficient to drain ordinary roads, although, of course, there would be no objection to a greater depth of stone, except on the score of unnecessary expense. The gutters of the highway were paved with stone, eight or ten inches long, two or three inches wide, and four to six deep, and the edge of the sidewalk was cut to a straight line and neatly sodded. I have forgotten to mention an important part of the road improvement, namely, the eight inch tile pipe placed in the sidewalk along the borders of the gutters to receive drainage water through basins covered by gratings, and set usually about three hundred feet apart. At the base of every considerable slope, often much nearer than three hundred feet, similar basins were placed, and also near the gates of the entrance. These basins were made of good size, say two and a half feet wide by four feet deep. The final outlet of the drainage was a stream that flowed across the road at the bottom of the hill, just below the immediate lawn of the house. Over this stream crossing the road, a good stone culvert was built, and also one at either of the entrance gates. The roadbed itself was finally so graded that two-thirds of the width of its surface had but little fall either way towards the gutters. The part adjoining the gutters sloped quite rapidly. There is nothing more disagreeable in country highways than the common practice of rounding up the earth with the plow and shovel to the middle of the road, until the convexity is so great as to hardly permit two carriages to pass comfortably. The proper way is to give the road a good stone foundation and keep the surface comparatively level, except near the gutters. Then, to prevent heavy ruts and gullies, which would appear more readily in the center of comparatively flat roads, care should be taken to fill up holes and hollows as soon as they are made. Maintenance of this kind lies at the very foundation of good road work in all countries. The last thing done to the road in question was the graveling. Fortunately a pit was found near by that yielded a sharp angular gravel. This, with due admixture of loam, was spread five or six inches deep on the broken stone, and rolled with heavy iron rollers until a solid " bond " or concreted mass was produced. No road should be considered finished until the gravel has been thoroughly bonded by long continued rolling. Abundant use of water from a sprinkling cart, when rain does not kindly fall, is absolutely necessary to secure the desired bond of gravel and clay. On the road under discussion the truth of this was discovered at considerable cost. For days during a dry spell the rolling was carried on with comparatively little effect, until a sprinkling cart was brought into service. I will state here, for the benefit of those who do not happen to know of the fact, that in Central Park a sharp angular grey gravel is used that now, for thirty years, has been transported to the park from a large deposit found on both sides of the Hudson near Peekskill.

This gravel, bearing the name of Roa Hook, was finally chosen by the Park experts, after many experiments, and is doubtless one of the best gravels for establishing a perfect bond on a road to be found anywhere. The only objection to the use of Roa Hook gravel, in this way, mixed with loam to make the necessary bond, is that during certain seasons of the year it becomes somewhat muddy. I have used with success in several instances, notably that of Mr. Schermerhorn's place at Whitestone, L. I., an admixture of Tompkins Cove, so called, Limestone and Roa Hook gravel. The theory of this admixture is the attainment of the desired bonding quality by the cement-like and friable quality of the limestone. In the case of Mr. Schermerhorn's place particularly this plan has worked well and made a drier road than would have come from gravel mixed with loam. This Tompkins Cove limestone is much used about New York. It certainly makes a dry road, but not as clean and even a road as the gravel. Its soft and friable character causes it to grind more or less rapidly under the wheels of carriages, and to develop ruts, and the dust and sticky mud created thereby is, of course, objectionable. A good road, though a somewhat expensive one, may be made with broken stone covered with trap rock screenings and loam. Granite broken up fine does not readily establish a bond with ordinary sandy loam, or even with a clayey soil. As a general rule, throughout the country, good sharp gravel is the most readily attainable and satisfactory substance with which to cover a road. The private road leading up to the front door of the place we have been describing, was constructed and drained like the highway. These private roads were about fifteen feet wide, with narrow paved gutters a foot across. It may seem to some that a good deal of trouble was taken with the drainage of this place, but I can assure you that in a country where the mud abounds as it does along the Hudson this is the only safe course to pursue.

Before leaving the consideration of this country place I want to call attention to the decidedly unique plan adopted for planting the fence line and sidewalk. Shrubs, lilacs, snowballs, etc., were disposed as usual in an irregular line or border along the fence, but in this case many of these shrubs were planted so as to stray out over the sidewalk and group themselves in clusters along the highway. An important principle of good landscape gardening was well illustrated on this place, namely, simplicity in design united with great variety in detail. There was an evident and broadly conceived plan, including two or three open lawns, an unbroken boundary plantation, shade trees on the walks and roads, and after that the greatest variety of detail everywhere.

The lawn and border of the walks and drives swelled into larger or smaller mounds wherever trees or rocks invited a natural and irregular treatment. Recesses in the walks and drives were made at such places as would naturally suggest the advantage of a pleasant seat, or some sort of small plaza for standing room. In a word, parallelism of the two sides of the walks and roads and highway was the rule, and this rule was varied whenever convenience and artistic effect suggested it. Regularity was made to apply, in the same way, to the contours of the lawns and borders of the road and highway. The slopes and level spaces were broadly and simply adjusted on a large and definite system, but, wherever artistic fitness suggested it, a mound was perhaps increased, and a hollow deepened, even on the very edge of the highway. Where a great rock or boulder lay on the border of the highway, for instance, it was not only left in place, but two or three other rocks were set in the ground close by. Bays and points of the plantations were not only accentuated by the presence of striking shrubs and trees, but they were deepened or extended, as the case might be, to what would seem, to some, almost abnormal dimensions. There was simplicity, dignity, and unity of design everywhere, united with almost unlimited variety. I find myself betrayed into thus illustrating some of the most important principles of lawn making in general because they are intimately related and connected with the arrangement and construction of private roads and highways.

And now for the country seat on the seashore.

I shall not weary you by considering all the details of the construction of its highways and private roads. Soil and climate are, after all, the chief influencing conditions that determine the different treatments of the two places we have been considering.

The soil of the one by the seashore, being mostly sand, almost drained itself, so that a coating of gravel of as stiff and clayey a nature as could be found near by was used for the surface of the road. Occasionally washouts of considerable extent occurred, as a matter of course. To meet this danger ample gutters were kept open and occasional brick basins introduced with open bottoms to permit the water to sink away in the light sand. The soil and climate will, of course, affect the shade trees along the highways of these seashore regions. The list of good shade trees, therefore, in such regions must be necessarily limited. I will cite three or four species comparatively reliable in the seashore regions, giving them in the order of their merit. They are as follows: Oriental Plane trees, Tulip trees, Honey Locusts, Poplars, the Lombardy and Balsam, and the American Linden. The American Elm should be, perhaps, included in this list, although I have found it by no means successful on all highways by the seashore.

And now I come to what I consider the most important part of my subject, namely; the maintenance of highways and private roads. It demands that special stress be laid on it because it is so much neglected and undervalued. We construct many of our roads well enough in this country, but seldom maintain them properly. The best constructed road will not take care of itself, and consequently, with neglect, soon falls into decay. Private roads and highways should, as a fact, receive as frequent and continual attention as the beds of a flower or vegetable garden. Every rut or washout should be, on the stitch in time principle, filled up with gravel as soon as it appears, and occasionally, especially in spring, rolled with heavy iron rollers. If the washouts or ruts be of considerable size the gravel used should be wet, and immediately rolled afterwards. After every heavy storm the gutters and basins should be thoroughly cleaned out, and in dry weather the sprinkling cart kept in active play. All this work will be more or less expensive and engrossing, according to the character of the season and the amount of travel on the roads. On the two places I have been describing the necessary pains were taken to do this work, and the results were very satisfactory. Nothing could have contributed more to give the character for high excellence for which these places were justly celebrated than the pains-taking practice of carrying out the simple operation of maintenance. I should say, concerning the sidewalks of the highways of both places, that the grass was always kept cut and the borders neatly trimmed.

On the seashore place the sidewalks of the highway, being little used, were covered entirely with smoothly cut grass, and consequently had no foot path of gravel. The trees and shrubs were systematically pruned on both places as occasion required. Some trees and shrubs would need pruning every year and some only once in several years and others not at all. Plane trees and Poplars, for instance, require, after a few years, frequent and sharp pruning to keep them shapely and vigorous. In the neighborhood where the Hudson River place was located a village improvement association had been established. This society had succeeded in organizing a general system of pruning the road trees over a considerable area. The town authorities co-operated with the association, and before long the beneficial results were evident to a marked degree.

The idea was suggested, and it was a good one, that trees should be planted inside the fence line, in accordance with a general plan for the improvement of the sidewalk. These trees should be Elms, if the road trees were Elms, and all should be under the general care of the improvement association. The object of this would be to secure a double row of road and sidewalk shade trees at equal distances apart to enable them to grow to their natural dimensions. On a sidewalk twenty feet wide this could not, of course, be done. Such an arrangement, naturally, was not put into practice, although it may be seen working well on the walks around Manhattan Square, N. Y. People wanted in this case to control their own lawns. It might do very well, they thought, for an ideal state ot existence, but really they were not quite up to the plan in the present state of society in the nineteenth century. To arrange for cultivating, pruning and otherwise caring for the road trees was, of course, simple enough. One gardener, with two or three assistants, was employed by the association to do the work.

And now, in conclusion, I wish to say that I am fully conscious that I have treated my subject in a meagre and incomplete manner. There is much I would like to say about the general control and management of highways throughout an entire township, of town laws and town officers of highways. There are also many things that might be profitably considered regarding good maintenance, such as mending holes with broken stone, scraping mud, etc., off the highways after rains ; but I refrain. After all there is, it is evident, no code of instruction or set system of rules for making and keeping up highways. One must, perforce, study his environment in the light of his own experience and that of his neighbors, and do the best he can within his own peculiar limitations.

Mr. Rives: We enjoy the pleasure of having with us this evening an eminent master of the science of road building. Though his earlier thoughts were directed to the transportation of armies and of the great engines of war, he has, with all his heart, directed his later studies to the problems of the intercourse of men and the transportation of the products of the victories of peace. You will now have the pleasure of listening to Professor Trowbridge, of Columbia College.

Prof. William P. Trowbridge said:

Mr. President and Gentlemen of "The Farmers" Association: I beg to express my sincere thanks for the honor of the invitation by which I am permitted to join to-night in the discussions of this Association, relating to "Country Highways and Private Roads—their Construction, Improvement and Maintenance." This is a subject of special and peculiar importance at the present time in this country.

Although it is at all times one which presents, in its various phases an extensive field of inquiry, embracing the history of roads from the earliest times, the influence of facility of communication between cities and towns, in various ways, upon the progress of society, the increase of the resources of a country, and the civilization of the people; yet, at the present time, we have to deal not so much with these topics as with the means by which our highways may be improved and properly maintained.

It is doubtful whether the general principles of road building, as developed and practiced by the great road engineers of the first half of the present century, Telford, McAdam, Macneill, Nimmo and others, can be greatly improved; yet it must be admitted that the introduction of railroads diverted public attention from the value and importance of our country roads at the very time when they were in the first stages of their proper construction and development, and that, for many past decades, notwithstanding the occasional appeals of patriotic citizens, the public authorities have extended but little aid to these internal improvements, beyond the enaction of laws by which local communities were to be governed in the appointment of road-masters, or in the levying of local road taxes.

The time has now come, it seems to me, when persistent efforts should be made, on the part of the farmers of the country, looking to a recognition of their rights to a proper share of the benefits arising from the general increase of wealth and prosperty.

I propose to confine my remarks this evening, therefore, largely to this main topic, "The Need of State Aid to our Highways;" and it will be proper to inquire whether such aid is necessary, and whether it is at this time an evident duty of the States to extend to the farming communities the assistance that is needed, and also whether such aid, if rendered, will not result in a general improvement in the resources of our several commonwealths.

These topics will lead us to inquire into the present state of our highways, especially in the older sections of the country, New York and New

England ; and, secondly, into the engineering questions involved in a general system of improvement, and also the necessity of the organization of special road departments or commissions, supported by liberal appropriations of money. In a farmers association it would be ungracious and unfair to impute, in the slightest degree, the unsatisfactory condition of our highways, at this time, to their neglect. They have, with vast expenditures in the aggregate, of time and money, given to the general public the best communications their means would afford.

There was a time, just before the introduction of railroads, when numerous main lines of post roads were kept in fair condition by chartered turnpike road companies ; and the general government extended its aid to some such inter-state lines of communication ; but these times have long since passed.

New towns and cities have sprung up along the railroads, absorbing the wealth and profitable enterprises which were formerly scattered through the country districts ; and the young and vigorous population of both sexes have flocked to these new centres of activity, leaving the old homesteads for more profitable fields of industry.

These causes, combined with the overwhelming advantages of the great west in supplying products for which the farmers of the east formerly found a ready and profitable sale, have produced a falling off in the value of farms in the Eastern States, and a struggle for existence in farming communities which allows little time or means for the proper improvement of highways. Indeed, in many places the farms have been deserted, and the roads are utterly neglected and often in a dangerous condition. It does not require a long search to find such places. In fact, it may be stated as a general truth that a farm ten miles from the nearest railroad station has little value in any part of the east, especially in the mountainous or hilly regions. One may travel in almost any direction out from the most populous and prosperous towns and cities, and in the course of a two hours' drive come upon extensive second-growth forests, covering ground that was once divided into rich pastures and fertile fields ; nothing remaining as evidence of former cultivation but lines of old stone fences, and perhaps here and there the ruins of old chimneys. In such places some efforts are made to keep the main highways in a passable condition, particularly in the near vicinity of the towns ; but elsewhere even the old post roads are often intolerable, and many cross roads, through long neglect, have fallen into disuse.

Methods of repair and road management have changed but little during the last half century, except in the near vicinity of populous centers. Many of us can well remember how matters were managed fifty years ago. At the annual town meetings the last act was to elect or name the path-masters, each to have charge of a subordinate road district. The path-masters, in their own convenient time, notified the farmers that they were severally to expend a certain number of day's work on specified portions of the roads. It was often hinted that the path-masters considered the roads adjacent to their own premises to be most in need of repairs, and that these received most attention; but, as there was a regular rotation in the office of path-master in those days, the adjustment of individual interests was not difficult. A "day's work" then had, in road nomenclature, its own technical signification. When the farmer turned out, with his two or three sons and his hired man, to make his annual contribution to the general good, in work, he was permitted to count his yoke of oxen, his wagon, his plough, his tools of every kind, and to give them certain pre-arranged values in multiples or sub-multiples of a "day's work." If a farmer owned a common road-scraper he was fortunate, for this counted highest in the scale; and generally it was surprising to find how many day's work could be accomplished in a single day by one man, with a judiciously selected outfit. The method of work, which has undergone little change, consisted in ploughing up afresh each year the mud of the side ditches, and, with the scraper, carrying it into the middle of the road, whence it was sure to be washed back again by the annual rains. On steep hills a few furrows were made by the plough, diagonally across the road, forming a shallow ditch and a water-bar to prevent too much of the roadway from being carried down the hill by the surface drainage. Bridges were of the most common description; the most forcible and effective arguments for their gradual improvement having been found in occasional successful actions for damages against the towns for loss of life or injury to animals caused by defects in their construction. This whole system prevails largely to-day, and while the resulting roads are, in general, passable, they are not good. Nor can they be made good as long as the system prevails.

I desire to repeat that we are not to find fault with the farmers. They are not able to inaugurate and carry out a better system, except, perhaps, in some minor details.

A significant instance has recently come to my notice of such an attempt on the part of farmers, along one of the most important roads in western New York, the great road between Lewiston and Rochester. A portion of this road, about three miles in length, passed over a foundation of clay, which rendered ordinary methods of repair ineffective, and it was resolved that it should be Macadamized. Stone was brought and broken up by hand, at the expense of the town, and a beginning made; but the cost of breaking the stone and placing it on the road proved too great. Heaps of stones still lie along the road, unbroken, because the farmers cannot pay the necessary taxes to continue the work. A stone breaker, a good road roller, and a competent road engineer, with a small sum for the expenses of the work, would help them out.

It may be well to enter somewhat into details in regard to the advantages of good country roads. As regards the more general advantages, I cannot resist the opportunity for quoting the words of an authority in England, written fifty years ago. They apply with great force to the condition of things existing in this country at the present time, leaving out the rather hard sounding epithets which were, perhaps, at that time applicable in some degree to portions of the United Kingdom. "Roads" says the writer "may be described as both the cause and effect of civilization; the formation of roads invariably tending to improve the most barbarous districts, to evolve its resources, and civilize its people; while, on the other hand, the internal communications of a country afford the surest proof of its prosperity, and her roads the infallible signs, because the certain consequence, of her civilization." "Let us travel over all the countries of the earth, and where we find no facility for traveling from a city to a town, or from a village to a hamlet, we may pronounce the people to be barbarous." "The beneficial effects resulting from an easy communication between the different parts of a country are productive of luxury to the rich, wealth to the merchant, employment to the poor; by all felt, because by all enjoyed, and because the conveniences of life thus brought to the mansion and the cottage tend materially to ameliorate the condition of man, and to raise the standard of society." "Next to the general influence of the seasons upon which the regular supply of our wants, and a great portion of our comfort, so much depends, there is, perhaps, no circumstance more interesting to man in a civilized state than the perfection of the means of communication."

Let us consider, however, what are more specifically the advantages that must surely result from proper improvement in construction, maintenance and management connected with our own highways. Although we have no barbarians to be civilized, yet we have resources to be developed, abandoned districts to be reclaimed, obstacles to prosperity in the rural districts to be removed, and many unfavorable conditions to be ameliorated.

A good road implies proper grades and a smooth, even and hard road surface of sufficient width, well prepared and drained, so that the ease and comfort of travel are little affected by the seasons. It is of course impracticable to provide the very best in country districts, on account of the cost; and the realization of the above conditions, in the highest degree attainable, is not to be expected except in the immediate vicinity of large cities: but, considering the much smaller amount of travel over roads more remote, and the less width allowable, it is within the resources of every State in the Union to secure these conditions to a very high degree for all first and second class, or State and County roads, and, to a reasonable degree, for the third class or town roads. As to grades, while it is true that our highways and town roads are already laid out, and have been in use for many years, and the grades have, in a great degree, been fixed by chance; yet it is also true that in many cases an alteration may be secured, where desirable, by a local change in the lines, and that the cost of such changes will be compensated for many times over in the economy of traffic and in general improvements. Many notable instances are given by writers on this subject, in which a local change of line has, with a small increase in length of road, enabled every passing wagon to avoid surmounting many hundred feet in elevation only to descend again to the level of the starting point. Changes of this character may often be made merely to secure an easier draft for horses, and to avoid the risks attending steep ascents and descents. A horse that can exert an average draft of 120 pounds on a level can only draw, as an average, about 75 pounds on an up grade of 1 in 30, or about 50 pounds on a grade of 1 in 20, and only 30 pounds on a grade of 1 in 10. The effect of this upon the loads which a farmer may carry to market with one or two horses is apparent. While on this subject it may be stated that observation has shown that the steepest grade that should be allowed on a first class road is about 1 in 20. The greatest load that a horse may, with comparative ease, carry up a grade of 1 in 20, for a short distance, he will take at a trot up a grade of 1 in 30 for a longer distance, and without greater fatigue. For much traveled roads it is recommended, by the best authorities, that the maximum slope should therefore be kept as low as 1 in 30, in order that, for passenger traffic, the speed may be at a trot, and for the further reason that it will not be necessary to hold back the load, in descending, with too much force. Proper grades constitute, therefore, one of the chief advantages of well designed roads; and the improvement of grades, in many hilly portions of this country, would, in a thorough system of improvement, be an important consideration.

The chief advantages of good roads are to be found, however, in the road surface; and these advantages apply everywhere, whether the face of the country be hilly or level. There is nothing more exhilarating than a brisk drive along a firm, smooth and perfectly kept country road. Whether for relaxation and pleasure, or for ordinary traffic, the gratification is the same. Even the horse seems to enjoy it, and, if he be not over-driven on the road, nor neglected in the stable, cheerfully performs his daily tasks.

To the farmer, however, this means much more than mere gratification, and the pride he naturally takes in his well-cared-for team. He finds that, with the gratification, there is a great and substantial profit. Five or ten miles is not then a distance from centres of traffic which affects greatly his prosperity. In a light wagon an hour and a quarter with a good road brings him to the town; and if he carries produce to the market he is hardly concerned as to how much he shall place upon his wagon, if there be not too steep grades. Winter and summer are alike. His vehicles are not frequently broken nor rapidly worn out. He can turn everything he produces into money or its equivalent, and is thus able to supply his family with many of the comforts of the town. He is able to help to sustain for his children good schools, and to afford for his family those little luxuries which induce self-respect and a desire for social improvement.

If country roads are in bad condition a distance of ten miles, or even less, in hilly regions, from the nearest railroad station means to the farmer isolation, the absence of social refinements, and hard struggles to procure the necessaries of life; conditions which lead ultimately to the abandonment of such regions, and the dispersion of families.

As to what constitutes a good road and a bad road, it is necessary to be more specific. While there are many degrees from good to bad, the best being impracticable, in the country, on account of cost, and the worst being so bad as to be indescribable; yet, for country highways, the common or popular interpretation of these terms does not involve a great deal of confusion in regard to characteristics and quality. These characteristics relate chiefly to grades and conditions of the road surfaces; and, indirectly, to width and curves.

The engineering questions connected with construction and repairs for different classes of roads, and for different kinds of soil and surface geology, require separate consideration. All these subjects are usually referred to three classes of roads called, sometimes, State, County, and Town roads, and having corresponding designations also as First Class, Second Class, and Third Class roads. This classification is based not so much upon the length of line between two places, as the amount and character of the traffic or travel over the roads; although it is true, as a general rule, that first class roads connect a series of important towns, while second class roads are more limited in length, and third class or town roads intersect the more important ones, and serve also, especially, as means of inter-communication between farms.

In regard to ruling grades on these different classes of roads, the results of long experience in countries where the most attention has been given to the subject indicate that for first class roads the greatest inclination should not exceed about 3 in 100, for second class roads 5 or 6 in 100, and for third class or town roads 8 in 100.

These grades are, respectively, somewhat less than the angle of repose of vehicles, taking into account the condition of road surface appropriate to the different classes—the angle of repose being the grade or slope at which a vehicle will run down under the influence of its own weight; and it is advisable, if possible, that the ruling grades should not require the application of brakes in descending.

In laying out new roads proper grades can generally be easily secured, but in the improvement of existing roads it would not, of course, be desirable to change the line in order to secure absolute conformity to the best grade rules. Established lines of highways, especially in hilly regions, are often so notoriously objectionable in this respect, however, that in many places the ordinary conveniences of travel or traffic demand a reduction of grades at any reasonable cost; while it would often happen, as has already been said, that such changes would be in the direct interests of economy. Proper surveys and reconnoissances, by engineers of good judgment, would reveal many opportunities for improvement in this respect. It need only be said further, on this subject, that for proper drainage the side ditches of a road should have an inclination at the rate of not less than about 1 in 100, or approximately 50 feet in a mile.

A hard even road surface, free from dust, mud and small fragments of stones, reduces the tractive resistance to the smallest limit. To secure and maintain this condition in the degree appropriate to each class of roads constitutes the most important part of road building and road repair. In this the skill and judgment of an engineer are especially called into play, the controlling element being, in all cases, the cost. In this branch of engineering, as in most others, it is not so much the possibility of accomplishing a given purpose that is to be considered, as the practicability of doing it at a reasonable and appropriate cost. There are three principles of construction and maintenance in road building, however, which are fundamental, and which cannot be violated with indifference, even in the poorest road that merits public attention.

These are: firmness of foundation, proper drainage of the road surface and of the whole site on which the road is built, a smooth and hard road surface, and continued, if not, indeed, continuous, repairs.

The foundation or formation of the bed on which the road materials are laid, and the thorough drainage of this foundation, are, therefore, the first subjects to be considered.

The surface of the country everywhere is composed of materials which have been derived from the disintegration of rocks, and brought perhaps by ancient water currents long distances, and which are more or less compacted in layers, except the very top surface, which is loose and incoherent, and generally mixed with vegetable mould. This is a general description of the surface of any portion of this or any other country. The materials constituting the sub-surface present a great variety of characteristics, from coarse gravel, mixed with boulders and cobble, to fine sand and clay, offering every degree of resistance to pressure, to the percolation of water, and to comminution under the hoofs of horses and the impacts of wheeled vehicles. There are, thus, usually presented along the line of any road of considerable length, surface soils of gravel, sand and clay, pure or intermixed, requiring for country roads corresponding modes of treatment. For all kinds of soil it is considered, however, that a foundation or Telford road presents all the good features that can be attained.

For first class roads it will generally be found necessary to remove the natural soil to a depth of 10 to 12 inches, whatever be the character of the surface or the subsequent filling in. For the very best or Telford roads the filling consists of large pieces of broken stone laid at the bottom of the excavation, with successive well compacted layers of broken stone or gravel, or a combination of both, upon this, and a finer binding mixture of one or two inches of the hardest gravel over all. If the layers be successively compacted by a heavy roller a perfect road is secured. Effective side and cross drains complete the construction. The modern Macadam system dispenses with the foundation stones, the whole excavation being filled with broken stone of small sizes laid in layers and well compacted by rollers. The advantages of the stone breaker and the steam road-roller in modern times add greatly to the facilities for extending the adoption of this best quality of work; as with these implements better work may be accomplished, accompanied also by a saving of time and of cost. The firmness of the top surface produced by the heavy road rollers adds greatly to its durability. It will always be a question, however, how far this more perfect construction can be adopted.

For second class roads modifications must generally be accepted, on account of first cost.

The broken stone surface was first introduced by Macadam, who spread the stone on the natural surface, without excavation, and depended on the passing horses and vehicles for compacting it. This practice is now rejected by the best engineers; but the Macadam idea, with an excavated foundation and heavy rolling, still prevails. The Telford system is distinguished by the heavy and larger broken stone at the bottom, as a foundation, with the layers of smaller and finer materials at the top.

The Telford system is, however, too expensive to be generally adopted for highways, and modifications must be accepted. Good pit gravel may be substituted for broken stones with excellent results, and, where such gravel is easily obtainable, it is a common practice to construct the entire road surface of this material.

I have seen excellent second class roads made of gravel, with the very least amount of excavation for the foundation. In fact, where the material is abundant, or not too costly on account of haulage, it is an admirable material for country highways, provided simply that it be well rolled, well drained, and continuously repaired. Care must be taken, however, in putting down the materials, the coarsest gravel being placed at the bottom, and fine gravel, mixed, perhaps, with sand, spread over the top as a binding material, the whole being well compacted by rolling. With a clay foundation it may be necessary to introduce broken stones for the bottom layers.

As most of the improvements in roads or highways that may be immediately effected must doubtless consist in the application of this system, we are brought more directly to the consideration of what is needed, and what is at present practicable.

It will, perhaps, be best to describe first what is to be understood by bad roads: and if this description be recognized as applicable in any degree to our highways, it will be evident that, where applicable, improvement is needed.

A bad road is one where the grades have been determined by mere chance; where the road surface is thick with dust in dry weather, and correspondingly muddy in wet weather, and is always filled with ruts; where imbedded rocks project above the surface; where rolling cobbles or loose stones exist to such an extent that they cannot be avoided by the most skillful driving, and where they consequently rapidly wear the vehicles and endanger the horses, especially in steep down-grades; where the side ditches are blocked up, or do not carry off the surface water; where the hedgeways bordering the roads have been allowed to enroach upon the roadway, and prevent the sun and wind from exerting their natural effects in drying the road; where the track has been reduced in width to a degree that makes it impracticable, except here and there, for two vehicles to pass without risk, and, perhaps, real danger; and where all these circumstances combined so increase the average tractive resistance that two and, perhaps, four horses will scarcely do the work of one on a properly constructed road, and ordinary haulage of reasonably heavy loads becomes impracticable or impossible—these are roads to be avoided; and yet they are unfortunately too common to be avoided.

The obvious means of economical improvement are the reduction of excessive grades, the widening of the road-way, the cutting away of hedgeways, the deepening of the side ditches, the removal of all embedded projecting rocks and of loose and rolling stones, the removal of dust and mud as fast as they are produced, and the gradual application of new material, properly selected and adapted to supply the waste and to prevent the formation of ruts.

It has often been said that there are no circumstances to which the old adage "a stitch in time saves nine" is more applicable than in the repair of roads; and the first movement towards securing better highways should embrace the absolute provision for *continuous* repairs, annual repairs being ineffective, costly and unsatisfactory.

This imperative condition places even the most economical system beyond the unaided efforts of the farmers. The matter is reduced, by the very nature of the problems and the circumstances of the times, to the alternative of efficient and liberal State aid or roads going from bad to worse.

In the first case, districts which are now desolate may be reclaimed and re-occupied by an intelligent and thirfty population, new attractions will be offered to the throng of town and city residents who desire to seek the country for relaxation and health, and farm industry will be restored to its former profitable conditions.

In the second case, the present generation may reasonably be charged with a failure to meet its obligations. When we see a State like New York spending nearly twenty millions for a State House, the question presents itself whether it would not have been more conducive to the general welfare to have expended half this amount only for a State House, and the other half on surveys and improvements of the highways of the State. That ten millions is not an excessive amount to be paid for internal improvements of this kind, the benefits of which are so generally diffused, may be judged from what has been done in some of the countries in Europe.

I will quote from the most recent statistics of Spain, Italy and Switzerland, three European states which are certainly not among the most rich and powerful.

The money expended by Spain on first, second and third class roads in 1881 and 1882, amounted, in the aggregate, to $18,892,117—on new construction $8,903,077, and on maintenance and repairs $9,989,040—covering 4,716 miles of first class roads, 6,391 miles second class roads and 15,108 miles third class roads.

The government of Italy expended in 1883, for maintenance and repairs, $1,600,000. There were employed 265 chief road masters and 2,166 road masters. Their pay amounted to $281,000 additional. The total area of all the roads improved under special laws was 13,984 acres, of which the gravelled roads occupy 9,637 acres.

In Sicily nearly $5,000,000 have been expended on state or first class roads since 1862, exclusive of nearly $6,000,000 on bridges.

Switzerland possesses, according to the most reliable authorities, the best roads, in proportion to area and population, of any country in Europe. Of first class roads there are about 4,000 miles, and of other roads 4,200 miles, the cost of constructing the first class roads having been $34,679,000, about $13 to each inhabitant. The average cost of maintenance is about $100 a mile.

I believe there is no instance of a country having such roads as are to be found in France, England, Norway, Sweden, Germany, Italy and Switzerland, where costs of construction and maintenance have not been met, in a large degree, by the governments, and where the construction and repairs have not been under the control of government engineers.

There is no reason to believe that this country may be able to accomplish similar results in a different manner, or without State aid. The problems and the conditions are the same in every respect, physically and socially. While, therefore, a diffusion of knowledge in regard to the fundamental principles of road building is desirable, it is very certain that the first steps towards any general schemes of improvement must be taken in the legislatures of the States; in the establishment of "Boards" or "Commissions" for highways, and in the appropriation of moneys to be expended by such commissions, under competent engineers and properly qualified road masters.

The timely interest in the subject manifested by "The Farmers" is encouraging, and the influence of this association will, I am sure, be felt everywhere and everywhere gratefully acknowledged.

Mr. Rives: We have present with us a gentleman who once wielded all the executive power of the Empire State. I know that he is at home in all matters relating to rural economy as well as to affairs of state; and, therefore, I feel confident that any remarks he may be pleased to make will be most acceptable to this assembly.

Gov. Cornell: Mr. President, your invitation came to me late, and without intimation that I was expected to make any remarks. But one thing which induced me to accept your invitation was the statement that the leading subject for consideration to-night would be that of country roads. That is a subject which has engaged my very serious thought, and I say to you, as a matter of confession, that, to my best recollection, the only state paper which I ever wrote and ever regret having written was one vetoing a bill providing for the purchase of a stone breaker for a town in Dutchess County. In excuse I will say that the principal reason for my action was not based upon the merits of the bill, but because the man who introduced the bill was, by profession, a contractor, and not a farmer.

I have been exceedingly interested in the papers read by the two gentlemen who have preceded me, and I trust that every gentlemen at this table has taken into serious consideration the suggestions which have been made. If all the gentlemen present will in the future utilize the good advice given in those papers, which are full of wisdom, I am sure it will result in very great advantage, especially if they will direct their influence towards practical suggestions to members of the Legislalure, soon to sit in Albany.

The State of New York embraces an Empire, which has been in the possession of a very intelligent people; some portions of it for nearly 300 years, while other portions have been but recently developed.

Dutchess County, and the County of which I am a native, Tompkins County, illustrate very well the difference between the Hudson River country and the Western New York country—the periods of civilization of which vary from 250 years to 100 years—in the matter of highways. In Western New York—excluding perhaps Genesee County, and some of the Counties of older civilization there—our farmers are accustomed to plow up the silt and wash of the roads in the gutters and throw it upon the middle of the road, which only converts them in the Spring to a condition worse than before they were repaired.

With a proper, provident expenditure of the money contributed by tax-payers for the maintenance of roads we would, in a very little while, see a marked improvement in the condition of our highways. The first thing I would recommend for every town in the State would be the purchase of a stone breaker. And I say that with all the more emphasis because I vetoed the bill for the purchase of a stone breaker for the town of Hyde Park in your county. Nothing involving so slight an expenditure on the part of the tax-payers would create a greater improvement in the welfare and advantage of the farmers. As in the case of railways, so also with the construction and maintenance of our highways, the best of materials will be found to be, in the long run, the most economical.

I shall be gratified, Mr. President, if the result of this meeting shall be the appointment of a committee through which the Legislature may be induced to make some beneficent amendments to the highways laws, that may contribute to the permanence of our highways, and do away with the improvident practices which now prevail. If the State Agriculture Society, in which the gentlemen around this table are influential, would recommend a line of proper amendments of the laws relating to highways, I believe it would result very soon in decidedly advantageous results.

Mr. Rives: One of our members, Mr. Bronson, has placed himself beyond the reach of veto power mentioned by the last speaker, by acquiring a stone breaker of his own. With that broad and public spirit which mark his doings, he offered to his neighbors to crush gratuitously all the stone they required for their roads. Besides this, he has taken an active interest in his neighborhood, and has succeeded in giving that portion of Connecticut in which he resides better roads then they have ever before enjoyed. If he will kindly give us some of the results of his experience, I am sure they will be of great advantage to us.

Mr. Bronson: Mr. President and gentlemen, I should really be very happy to give to you my experience in road-making, but I am afraid, after what you have already heard, it will be of very little service.

I was first induced to take up the question of road building in our county because the roads were so very bad. I suggested at one town meeting that they should do something to improve the highways, and was told they thought they were quite good enough. I found there was very little use in talking, so I concluded to make a specimen of a good road and see what they thought of it, and I did so. I constructed about a mile of what I considered to be a very good road. At the next town meeting I was greeted with a vote of thanks, and the suggestion that if I would be willing to work my taxes out the coming year they would be very glad to allow them to me. So I was induced to go on, and I began with the main road. Of course there was no question of laying out the road, as it was already there. The only thing to be done was to improve it.

The main road from our village to the railway skirted a hill, and of course the water that fell upon the hill ran down and percolated through the soil, and came out from underneath the roadway. This rendered it in the spring of the year almost impassable. To rectify this I built a drain on the hill side of the road, surrounding the pipe with broken stone or cobble stone. The adding of the stone to the work results in two advantages: first, that it allows the water to find its way into the pipe more quickly; and secondly, it keeps the roots of trees on the road side from getting into the pipe. When the roots reach the stone they cease to grow in that direction and search elsewhere for soil. This precaution will keep the drains clear. After sub-draining we had, of course, to look to the surface drainage—the water that fell on the road as well as that which accumulated on the roadside. We provided for carrying that off by open culverts and open bridges underneath the road.

My next step was to purchase a gravel bed, which I found, upon opening it, was very coarse. Almost half of it was composed of stones of about two inches in diameter. I commenced to screen the gravel, but found that to be altogether too expensive. Then I conceived the idea of passing the gravel and stone together through a crusher, employing a man to keep the stone and gravel well spread, so that they were evenly mingled. This I placed on the road to a depth of about six to eight inches, rolling it down as well as I could with a heavy roller of about four tons, drawn by four horses. A steam roller would have been far better, but I did not have one. After this rolling, depressions occurred, the road-bed not being as solid as it would be on the Macadam or Telford principle. These depressions were filled up with the same material until the road was thoroughly graded and a good surface was produced.

That road is standing the wear wonderfully well. The principal cause of success with it I attribute to the drainage. People say, "If you get a good surface on your road, and it sheds the water, what do you want to drain it for? No water can get into the road." But we all know that water gets up into our cellars, and they are wet, even though there is a roof over them; and why should it not be the same with roads? Unless you cut it off by a drain the water will get up underneath the roadbed. Proper drainage of the road, therefore, I consider a first requisite. With a well-drained road you will have a solid foundation, whether it is made of stone, gravel, or clay; and it will be dry. The amount of frost that will get into such a road during the winter will be very much less than if the drainage is neglected.

I built three miles of road in this way, at a cost of $6,942. That sum I divide into two classes—for labor and for material. The labor cost $5,783, the material $1,158. In the item "material" are included the cement pipe for the bridges, the drain pipe, and the gravel and sand purchased. I may say here that in the three miles there were 5,952 feet of drain pipe, and 1,135 feet of cement pipe, making nearly a mile and a quarter of drain pipe. A portion of the drains were dug to the depth of seven feet, making that part of the work very expensive. There was, of course, blasting to be done on the hill, and also for the drain.

This road is now in very good order. I drove over it to-day and found it perfectly dry, although yesterday, as you all know, it rained heavily. There was no mud whatever on the road.

I do not know whether it was due entirely to the success with this small section of road that I built, but last year the town appropriated $4,000, and the citizens $4,000 more, to pay for Macadamizing the road between Fairfield and Bridgeport, a distance of about three miles; and this year they appropriated a like amount for the road between Fairfield and Southport, a distance of a mile and three-quarters. This action shows that the people, when they see what a good road is, are willing to pay for it. Farmers do not like to go to an expense without knowing exactly what they are to get. In making this last appropriation the town of Southport said: "We will subscribe that amount, if we can get just such a road as we have seen. We do not want any other kind of road. We dare say there are better roads, but we know just what that is."

To apply this lesson of personal experience, I think that is what we ought all to do. We can all build a small section of road on improved principles in our own neighborhoods, and so give the farmers an object lesson; and if they approve of them they will subscribe towards continuing the improvement, and will do their best to carry it out.

The law in Connecticut is different from the law of New York. We appropriate moneys for different highways, just as is done in the City of New York for different streets. The taxes are all lumped, the State, County, Town, School and Poll Taxes all going into one treasury, and the town meeting appropriates certain amounts, and also gives out contracts to certain people, to maintain a road during the year. Certain amounts are appropriated for improvements, and certain amounts for maintenance. It is the best principle, and yet the result is not good. The roads in our State do not compare at all favorably with those of Massachusetts, simply because the material at hand is not nearly so good as the gravel that is found in Massachusetts. Gravel is easily obtained in Massachusetts, for it is found everywhere, and there is very little cartage to be done. Therefore the Massachusetts roads, as a rule, are far superior to any roads in Connecticut, New York or New Jersey.

There are thirty-three of us here, and if each of us would build a mile of good road there would be 33 miles of road distributed over the country, 33 object lessons to the farmers of the country. If we all determine to set a good example more good will be accomplished than by any thing we can do through the legislature.

Mr. Rives: We have present with us this evening one whom the press of the country kindly and affectionately calls "Our own Chauncey."

We Farmers, I think, may particularly call him "Our own Chauncey," for he is, above all things, amid all his multifarious occupations and professions, a Farmer. I have discovered, in fact, that he is perfectly in love with Macadam. He is Macadamizing a road now from here, it seems to me almost to the Pacific Ocean; and he calls it the "broken stone ballast." His opinion of Macadam is evident, and the opinion of Mr. Vanderbilt is much higher than that of a French Minister to this country, who, some years ago, when Pennsylvania Avenue in Washington was Macadamized, and a blizzard came in the month of March, which enveloped him in clouds of dust, rushed into a lady's drawing room, wiped his eyes and said he thought the sins of Adam were bad enough, but those of Macadam were infinitely worse.

We are always the better and happier for any remarks which Mr. Depew may make on such occasions as this, and therefore I take great pleasure in introducing him.

Mr. Depew spoke as follows: Mr. President and Gentlemen: I am always glad to be called upon by my friend, the President, at these meetings of The Farmers Club, because every subject that arises here is the one subject that I know less about than any other upon which I have any information whatever.

There is a lesson, coming down from the patriotic period, which might be usefully adopted by all the gentlemen about this table, and that is, the well-known fact that Washington, after retiring from the office of President of the United States, became a road-master of his district. The good roads about Mt. Vernon were due to the same efficiency which had led the Army of the Republic to success in the Revolutionary War, and had aided in founding the American Republic. It is also well known that Thomas Jefferson, after he retired to Monticello, finding the roads all about that country simply impassable, served for 10 years as road master of the district. The same is true of Martin Van Buren, and the same is true of almost all the great statesmen of the Country when they retired from public life and went to their country seats. All of which establishes the fact that the highest and most honorable positions that any man can hold in this country is that of road-master of his neighborhood.

It seems to me Mr. Bronson has touched the real source of good roads, so long as the State does not appreciate what is its proper duty; and that is, that each gentleman who has his estate in the country shall set an example. It may cost him somewhat more than his legitimate tax; but it will cost him infinitely less in reputation, and he will gain infinitely more in the satisfaction and gratification which he and his family and his guests will feel in the good roads over which they will drive about the country or to and from the station.

The most valuable paper, in my judgment, that has ever been read before this association during the five or six years in which I have been a member, is that of Prof. Trowbridge. It touches not only upon the subject of the comfort of the gentlemen who have country seats, but also upon a very much deeper question; and that is, the prosperity of the country, and the proper relations of agriculture, when prosperous, to the general prosperity of the republic. Our magazines are just now full of articles trying to show why agriculture is declining; why farms do not pay; why farmers' sons go to the towns; and why, as was contended in a recent discussion of the subject, the farmers, who have heretofore been the backbone of the country, and the conservative element which has kept us from communism and anarchism, because they voted on the side of property, are to become hereafter tenants and peasants. Everyone at this table will admit that when the vast agricultural element of this country becomes simply tenants and peasants, then the great vested interests, which yield incomes and make wealth possible and life enjoyable, are in danger. It is the independent property owning interest in this country, however small, which furnishes the conservation of all other property however large.

It seems to me Prof. Trowbridge has struck the real key-note of agricultural prosperity in touching upon what we all know to be, in a larger sense, the real prosperity of the country, the cost of transportation. Everybody knows that any district, new or old, depends for its prosperity first upon facility of transportation, and, secondly, upon cost of transportation. If facility of transportation is not provided that region remains a wilderness. If the cost of transportation becomes excessive that region becomes a wilderness. So far as railroads are concerned, the natural laws of competition—whatever may have been the effects of over-capitalization, or of building roads where they never should have been built—have reduced the cost of transportation to a point where all districts that are in immediate and easy contact with a railroad are prosperous. But a factory beyond reach of the railway station is impossible, and a farm beyond reach of a railway station is abandoned.

Prof. Trowbridge has hit the nail on the head in saying that they are abandoned because the cost of transportation from the farm to the railway makes the profitable raising of farm products absolutely impossible.

It therefore seems to me to be the present duty of this Association of Farmers to put their influence behind that paper of Prof. Trowbridge, and to urge the Legislature of our own State of New York, to begin with, to take up this subject in a broad and statesmanlike way, and utilize the surplus in the Treasury, utilize the immense resources of the State, (which are now hardly touched) in carrying out a proper system of internal improvements, which shall include such a liberal policy towards the highways of the State that they will not only be comfortable to ride upon, but will promote and continue the prosperity which will make the State of New York the Empire State of the country.

Mr. Rives: Gentlemen—We all observed with great pleasure the entrance of the distinguished Bishop of the Protestant Church of New York. I am sure he will commend our united efforts for the improvement of the roads of this State, because such an improvement is undoubtedly in the interest of social order, and, as Mr. Depew intimated, of morality and religion. Such an improvement will greatly gratify his people, who look forward with so much pleasure to his frequent and, they hope, more frequent visitations. Bad roads are instruments of cruelty not only to animals but to men. When men get stuck in the mud, it leads to very unorthodox observations and frequently to the use of those words that Byron designated as

> "The nucleus intense
> of Britain's native eloquence."

The Bishop, in winding up our discussion, is at full liberty to pursue any line of thought he choses, but whatever it may be, we know it will be good.

Bishop Potter spoke as follows: I am extremely obliged to you, Mr. President, for the opportunity of coming here this evening. And I was very sensible of the courtesy which, in the note that you wrote me, gave me permission to talk about roads or on any other subject. But I submit with very great respect that there is nobody at this table who has personally so large or so direct a concern in the condition of roads in this part of the State of New York as I. For there is not a man in this room, I believe, who is a commercial traveller; and there is no other class of persons but commercial travellers who use the roads so much as I do.

The Bishop of Nebraska said to me the other day, "There is not a town in Nebraska where I have to go to which I cannot go in a Pullman car." The reason of that, sir, is very obvious. The railways in Nebraska were built first, then the towns. But in the diocese of New York the towns were built first, then the railways. As a consequence there are a great many towns to which I have to go not by rail but by wagon.

The relation of roads to civilization, as Prof. Trowbridge has so ably indicated, is one of the questions concerning which I think we are very imperfectly awake. Nobody who troubles himself about the history of the greatest empire that the sun has yet shown upon—I mean the older Rome—will fail to recognize the fact that the triumphs of civilization there were coincident with the triumphs of roads. As Dr. Bushnell once said, armies marched over the roads first that were built by the Empire, and after the armies came the apostles. It is not, perhaps, known to the gentlemen in this room that before the Christian era there were 4,000 miles of roadway between Scotland and Antioch, over which one might have driven at the rate of 15 miles an hour, unbroken from one end to the other except by the English Channel and the Hellespont. It was after the magnificent triumphs of the roads that there came the triumphs of the Empire. I believe the same is true of our modern life, and of the relation of roads to civilization, to culture, to the promotion of human intercourse, and to the kindlier graces which come out of the concourse of men. And among the things which I should be glad if this club could promote would be not only the building of good roads, but the building of sign posts; for it is a curious experience of mine that local knowledge is apparently limited to the next town. I have rarely found anybody who knew the road to a place more than five miles away.

Now, what is practical christianity? I think that anybody who builds a good piece of road practices christianity. Until some remedy is afforded to those of us who are travelers, by the building of better roads, I submit that it belongs to you and others to afford some sort of relief. When my friend, the Bishop of Western New York, on one occasion got somewhat warm in debate, as his friend Mr. Jay knows he is capable of doing, he seized a book in the House of Bishops and dashed it on the desk, and said: "Mr. Chairman, I think that this right reverend house ought to set forth a form of sound words to be used by a christian man under circumstances of great provocation." I submit with great respect, that until this club has built better roads it ought to set forth such a form of words.

Mr. Le Grand B. Cannon: Mr. President—For the purpose of disseminating the valuable information that we New York Farmers have received, I move that a thousand copies of the address made by Prof. Trowbridge be printed, and that they be distributed among the members of the Legislature of the State of New York, and the representatives of the State of New York in the Senate and House of Representatives of the United States.

The motion was duly seconded, and carried unanimously.

Mr. Depew: I beg to make a motion, Mr. President, which I know will be received with universal applause and gratification. Certainly during our existence as a club we never have been more admirably or instructively entertained than we have this evening by the experts who have been invited to read papers upon the subject for discussion to-night. I move, therefore, that the thanks of the Club be tendered to the two gentlemen who have read most admirable and instructive papers before us this evening, and also to the Bishop whose attendance has lent to this occasion the charm of his exquisite oratory and the dignity of his presence.

The motion was seconded, and carried unanimously.

Mr. Cannon: Mr. President—It has been suggested, with the view of giving effect to the presentation to the legislature of the address that has been made here this evening on Country Roads, that a special committee of three be appointed, whose duty it shall be to prepare a petition to be forwarded, with the printed copies of the address, to the Legislature.

This motion, being duly seconded, was carried unanimously, and the President appointed, as such committee, Mr. Jay, Mr. Bronson and Mr. Sturgis.

The "Farmers" then adjourned.

# The “New York Farmers”

MET again at the Hotel Brunswick, on January 23, 1890, Mr. John Jay, presiding. Mr. Jay, in opening the proceedings, rose and said:

Gentlemen of the “New York Farmers”—I greatly regret with you the absence to-night of our president, Mr. Rives. But although unable to attend he has taken the greatest pains to secure for the occasion the cleverest speakers. Among the letters of regret received were those from Senator Stanford, Secretary Tracy, Mr. Charles Bachman, and Colonel Lawrence Kip, and at the last moment one came from Mr. Robert Bonner, who, however, has kindly sent a paper, which will be read to us.

The subject for discussion this evening is “The American Trotting Horse,” a subject of universal interest at home and of growing interest abroad.

In England efforts are being made to improve especially the coach horse and roadster. In that connection I may particularly refer to the Brookfield stud of Mr. Burdett-Coutts, who, as you know, is American by birth, and who is very successfully engaged with some of the old English breeds, thorough-breds, Hackney, the Cleveland bays and Yorkshires. Of the Brookfield stud at Mr. Burdett-Coutts' place at Highgate, London, and Sheley Herts, it may be remarked that among the most valued animals are two, Primrose and another sired by Shepherd F. Knapp, a well-bred imported American trotter described as unsurpassed for pace and action, and who is supposed to have inherited his action from the Hackney Bellfounder blood which is said to run strongly in the best American trotters.

But the trotting horse *par excellence* is an American creation, and can only be properly discussed in an assemblage of American gentlemen who devote themselves to the subject.

As the thorough-bred English race horse, which has been brought to such perfection in English stables, traces its origin to Arabia, so the finest traits in our trotting horse are attributed to Messenger, sired by Mambrino, and imported into this country at the close of the last century as the finest specimen of the trotting horse of that era. In the biography of Hiram Woodruff, the distinguished trainer, a work, I think, suggested by Mr.

Bonner, and dedicated to him, the author makes a remark about Messinger which is interesting and valuable as indicating the national and financial importance of our subject for discussion this evening. He says " When that old gray came charging down over the gang-plank of the ship which brought him over, the value of not less than one hundred millions of dollars struck our soil."

The aim of our American breeders of trotting horses, in which they have achieved a remarkable success, relates chiefly to beauty of form, to size, speed and staying power. Among the most famous of the progeny of that old gray have been horses and mares whose names are familiar to the gentlemen around this table. Many of you have witnessed some of their greatest performances. They include the most celebrated trotters in the world, Dutchman, Patchen, Flora Temple, Peerless, Princess, Dexter, Lady Monroe, Goldsmith Maid, American Girl and Mountain Boy, down to the horses of to-day, some of which belong to our friend, Mr. Bonner, who, unfortunately, is absent. Maud S.,. who has trotted in 2 m. 8¾ sec.; Jay Eye See, who has done the mile in 2 m. 10 sec.; and Sunol, bred by Senator Stanford, who, it is confidently expected will break the record, are all the property of Mr. Bonner.

The discussion to-night would have been of great interest to our late fellow member and lamented friend, General Grant, whose true genius and noble traits grow brighter, if possible, as time passes. The book to which I have referred, the Biography of Hiram Woodruff, contains a portrait of General Grant driving Dexter. And we all remember that General Grant acted as one of the judges in a race at Washington, where Dexter was one of the contestants, and where the English Minister, Sir Edward Thornton, and the French Minister, the Marquis de Monholm, were spectators.

The first address to-night will be from Mr. S. D. Bruce of *The Turf, Field and Farm* and of *The Trotting and Pacing Record*, who is thoroughly acquainted with the history of the leading trotters and their performances.

I have the pleasure of introducing to you Mr. Bruce.

Mr. Bruce: Mr. President and Gentlemen of the Farmers Club—It would probably be proper, on an occasion of this kind, to give something of the history and origin of the trotting horse, as the subject under discussion is " The Trotting Horse and his Origin."

The human race, as we understand from history, descended from Adam and Eve. The trotting horse descended, as I also understand from history, from three great sources of blood—the Arab, the Barb and the Turkish horse. To these three we trace the thorough-bred. The thorough-bred himself is the foundation of the trotting horse. Not a good one, of known pedigree, ever existed from the very first trotter that became famous, either upon the turf or the road, that did not trace its origin directly to a thorough-bred.

From the three great thorough-bred sources just mentioned, three families sprang. The Darley Arabian, founder of the Eclipse family, got

Bartlet's Childers, sire of Squirt, who got Marske, the sire of Eclipse. The Godolphin Arabian, who was really a Barb, got Cade, sire of Matchem, the recognized founder of the Matchem family. Byerly Turk, used by Captain Byerly, in King William's wars two centuries ago, founded the Herod family, through Jigg Partner and Tartar, sire of King Herod. Thus the Eclipse line descends from the Arabian, the Matchem from the Barb, and the Herod from the Turkish horse. From these families the American trotter descends, and to him I will now pass, pausing only to mention the connecting links.

The first horse which ever became prominent as a trotter was Mambrino. Mambrino was sired by Engineer, he by Sampson, he by Blaze, and he by Flying Childers, who was a son of Darley Arabian; Mambrino's dam was by Cade that sired Matchem. Therefore, Mambrino united the blood of Eclipse and Matchem. The first offer which was ever made to obtain a record for trotting speed was by Lord Grosvenor, the owner of Mambrino, who undertook to show fourteen miles within an hour, which was at that time something unheard of.

Mambrino sired Imported Messenger. Messenger came to the United States, landing at Philadelphia about 1788; and from Messenger's loins sprang all the great trotters of this day. He sired a number of horses who trotted in fabulous time, when railroads had not obliterated distance and steamboats were entirely unknown. For instance, he sired Tippoo Saib who got a horse called Dutchman, who trotted, if my recollection serves me right, three miles in 7 m. 32½ sec. That remained the best record for that distance for thirty-three years, when one of his descendants in a direct line, the famous Huntress, bred by Alden Goldsmith in New York, trotted the same distance, three miles, in 7 m. 21¼ sec. She was by Volunteer, son of Rysdyk's Hambletonian, dam, Lady Sears, by American Star, and inbred to Messenger.

Other famous descendants from Messenger made wonderful trotting records at long distances. Paul Pry, by Mount Holly, son of Messenger, dam by Hambletonian, son of Messenger, trotted seventeen and three-quarter miles, 1833, in 58 m. 52 sec. Whalebone, by Hambletonian, son of Messenger, dam, by Coffin's Messenger, also by Messenger, trotted thirty-two miles in 1 hour 58 m. 5 sec., and other equally good performances are recorded. But if we look at the advancement from thereon, we find that the thorough-bred blood which has been subsequently engrafted upon the trotter, has enabled him not only to go a distance at a high rate of speed, but to maintain that speed for a very long time. Of course the value of the trotting horse, as of all other animals, is his subserviency to man; and we know that the most useful of all the animals we possess is the horse.

Tracing on down from Messenger, we find that the greatest and grandest of all trotting horses descend directly from Rysdyk's Hambletonian; or the origin is traced through Abdallah, a son of Mambrino, by Messenger, and through a daughter of imported Bellfounder to a granddaughter and daughter of Messenger. So that he was really in-bred to Messenger, and Messenger is actually the progenitor of all the great horses of our time.

There are sections of the United States, of course, which are probably better adapted to the production of the horse than is the State of New York. But if we study the origin of the horse, and trace him up, we find that the very best specimens now in existence trace directly back, through pure lines, to importations made into the State of New York before the American Revolution. Abdallah sired Hambletonian; Hambletonian sired Electioneer; Electioneer sired Sunol; and Sunol, has accomplished what is considered the greatest and most wonderful performance of any age—a mile in 2 m. 10½ sec. in her three year old form. She traces directly through a descendant of the same Messenger, to a thorough-bred mare, a daughter of Lexington. Lexington, descended, we might say, through the same lines paternally, and on the dam side has a very strong infusion of the blood of Diomed, a horse which was imported into America about the year 1798, and who was 22 years old at the time of his importation. Luckily he lived to be 31 years of age, and left his mark both in the trotting and running world from that day to this; thus a horse which was sold for fifty pounds sterling and was subsequently sold for five thousand dollars, became the most famous equine sire in America of his day; and it is to him and to Messenger that nearly every extraordinary trotter of the present time traces his lineage. Diomed himself sired Sir Archy, out of imported Castianira by Rockingham both tracing back to the original parent stock.

A great many learned men who have studied this question of the breeding of trotters say that the thorough-bred destroys the trotter. But if we produce facts—and facts are stubborn things to overcome—we find that every good animal, every horse capable of carrying a man not only at a very fast gait, but of maintaining that gait, must have thorough-bred blood. There are horses of other bloods which show more of what some breeders style "muscular power," but which really is an excess of flesh; which does not produce that tendinous firmness and strong bone so peculiar to the thorough-bred, which last alone stands the test of the wear and tear of our hard roads. But we find that a cross of the trotter out of and then coming back again to the thorough-bred has produced such horses as Jay Eye See, with a record of 2 m, 10 sec.; Maud S., with a record of 2 m. 8¾ sec.; Sunol, with a record at three years of age of 2 m. 10½ sec.; Guy, 2 m. 10¾ sec., and others from 2 m. 11¼ sec. to 2 m. 14 sec. In fact every one of the dozen or more trotters with records of 2 m. 14 sec, or faster, exhibit such breeding.

The object is, and always has been, to breed that which should be able to trot not only fast, but to maintain a high rate of speed for a long distance. For instance, to take the first horse showing what might be called extraordinary ability to "stay" for a long distance; I will cite the horse Trustee, who was sired by Imported Trustee, a son of Catton by Golumpus, dam Emma by Whisker, tracing back to the Eclipse line of blood in England. The blood of Imported Trustee is among the most frequently found in the trotter. His son, Trustee, had for his dam, Fanny Pullen, a celebrated mare who was said to be highly bred, although no one could trace her pedigree.

This horse trotted twenty miles within the hour, being the first animal that ever accomplished the feat. Another very noted mare, which appeared as far back as 1858 was known as Fannie Wickham. She was strictly thoroughbred, tracing back to the same family from which originated the great Boston who sired Lexington and very many of the horses most famous upon the American running turf, and she trotted, back as far as 1858, twenty miles in 1 h. 10 m. 50 sec., and two mile heat, in good time. Her competitors in the twenty mile race were two miles behind her at the eighteenth mile, and she simply walked in from that point.

We want to know of course, how to produce the trotter, and whether it is better to breed him from the common or the Thorough-bred stock. The facts show that the thoroughbred element is the best. And there is no reason in the world why New York should not breed as good a trotter as Kentucky, or certain portions of Virginia, or California. California concededly has the advantage in climate, but the soil which produces grass —and therefore the grass which springs from it—I do not find to be so favorable in California as in certain portions of Kentucky, where limestone predominates; for better bone and muscle are produced where the water is largely impregnated with lime. The trouble with the breeders of the State of New York has been, I believe, the want of generous feeding. Colts are stunted in their growth and do not mature at an early age, in consequence of the want of proper feed, proper care, and proper protection from the weather, which is certainly much more severe here than in Kentucky. There is no comparison, as to severity, between the climates of New York and California.

But there have been good horses bred in the State of New York. The importations made into this State by our forefathers were among the best ever brought to America, and there are very few horses now famous upon the turf that do not trace directly or indirectly to importations made into this State by Gen. Delancey, before the American Revolution. Nearly every horse now upon the running turf which has accomplished a wonderful feat traces directly to a mare imported by Gen. Delancey, or to a daughter of hers imported by the same gentleman.

But, as I said before, there are points about the trotter, and his development, which the farmers of this State have never put into practice. And one of them is, his early development. The generality of breeders in Kentucky—and the same is true at Palo Alto—commence the education of the colt before it quits sucking the dam. Mr. Stanford has at Palo Alto, what I call a "Kinder-garden." He has a place used solely for the training of his young ones to trot, and to do nothing else. A man stands there and teaches them, by the flourish of the whip, to trot, and if they break, he compels them to come back again to the trot. These are two habits which if a colt at that age acquires it is almost impossible to utterly eradicate; but no horse can ever be made to trot fast at an early age unless his education commences in infancy—and that infancy must be before he quits sucking his dam. That has been practically demonstrated by the men who have raised the fastest and the best horses, and who have thus commanded the attention not only of the United States, but of the world.

We are far in advance of any other people in the development of the trotting horse, and he is beginning strongly to attract the interest of the people upon the other side of the waters. They are sending here now to buy trotters, and their exportation must eventually be a source of great profit to the farmers of America. Russia has her Orloffs, from which the great trotters of that country have descended. Several years ago a horse bred at Woodburn, Ky., Childe Harold, by Harold, trotted in Scotland, in 2 m. 28 sec.; and was then sent to Paris, and defeated all the best of the Russian horses. The West Indies, Buenos Ayres, and Brazil, before her troubles, were beginning to buy trotters here, and to import them. Germany, within the last two or three years, has also bought trotters very largely in the United States. There is now a very active interest taken in them, and the United States stands at the head of all the Nations of the Globe in the production of the trotter. We have demonstrated that he is almost capable of speed equal to our fast express trains for at least one mile if not more.

But, as I said before, the usefulness of this horse as a medium of rapid communication between points has passed. He is now truly an animal for pleasure; one which a gentleman in his leisure moments for recreation and health wishes to drive upon the road to enjoy his speed. It is no longer necessary that we should make a trip from here to Albany behind a horse, which once was done in very quick time, although the horse, unfortunately, died, being overdone. A descendant of Messenger has trotted 100 miles within 10 hours. Other descendants of his have repeatedly performed the feat of trotting twenty miles within the hour. But we are a humane people and those excessive calls and taxes upon the energy of the horse have, in a measure, been done away with. For humanitarian reasons only we do not want to over-tax a trotting horse; and we have done away with heats upon the running turf for the same reasons. We have discovered that the excessive training necessary to prepare a horse for these long trials of "heats" have so exhausted the vital powers—and they seldom have lived sufficiently long to recover those powers and reproduce themselves—that the mares and stallions have been worn out. History shows that the stallions have been more or less affected—probably to a limited extent only—while the mares have been seriously injured for breeding purposes. I might cite, as an example of this, the great racing mare Fashion, bred I think in New Jersey, but really having a New York origin, who was the greatest mare of her day, and who raced until she was eleven years old. She ran thirty-one races, twenty-one of which were of four miles heats. The training and preparation for such races was exceedingly exhausting. It was a common practice then to wrap the horse up with three or four blankets and run him four miles, and then repeat it, so as to do away with all the fleshy and fatty formation and leave simply the muscle, hard and tense. The result was, of course, that Fashion never bred anything worthy her reputation, of all the produce she had, Dangerous, foaled when she was twenty-two years old, after she had, in a measure, recovered her vital energies was her best produce. The same might be said of the great horse Boston, who ran some forty-five races, of which he won forty. Thirty of them were four mile heats, and nine at three mile heats. In his early stud career he sired very few good horses; but after he became 12, 14 and 16 years of age he got the great Lexington, and Lecompt from whom he acquired all his reputation as a sire.

So it is with the trotting horses. Goldsmith Maid raced at various times in heats until she was sixteen years old. Lady Thorn, Lucy and the famous mare, Lady Suffolk, did the same. Neither of them ever produced anything that could be mentioned as a speedy trotter; much less one equal to those of this day, when we are approaching two minutes so closely.

It is my opinion that if the "New York Farmers" pay attention to their stock, and breed from the proper blood, and select with care their sires and mares, of trotting action with a large infusion of thorough bred blood behind it, and feed properly and develop early, they must eventually produce as good a horse as can be produced in California, Kentucky, or any other section of the Nation. The whole secret of the production of the trotting horse, as it is of the production of any good stock from any race of animals, is proper care, proper shelter, and proper food, not neglect and starvation. A child will never make a strong man who is starved in his infancy; and it is exactly the same with the horse or any other animal which the farmers breed.

I thank you, gentlemen, for your courteous attention.

Mr. Jay: Gentlemen—I now call upon our famous auctioneer, Mr. Kellogg, who has, perhaps, disposed of more celebrated horses, thoroughbreds and trotters, in the East and the West, than any man living; and he has therefore had the best opportunity of becoming acquainted with their appearance, their pedigree, their points and their performances. I have the pleasure of introducing Mr. Kellogg.

Mr. Kellogg: Mr. President and Gentlemen—My friend and mentor, Colonel Bruce, has so thoroughly gone over the ground with regard to the foundation of the trotting stock of the country that it will be unnecessary for me to say anything upon that subject. I feel that in following him, I have been cut out of a great deal of information that I had hoped to be the means of imparting. He has made a pretty thorough exposé of the subject from the foundation to the present time.

When I received the invitation to partake of your entertainment this evening, I found enclosed in the letter of invitation a list of the members of your club. In that list were the names of a number of gentlemen who have been identified more or less with the history trotting horse, and the names of several gentlemen who have been actively interested in trotting stock for many years past. It was easy for me to detect among those names, several whose experience in the direction that forms the subject which you offer for discussion, will enable them to give you vastly more information than I can give.

The nature of the business in which I have for a good share of my business life been engaged, has required me to do a great deal of searching regarding the breeding of numberless trotting horses and their history and performances. It is in this way that I have come across the names of many of your members, that it is evident that I can give them little that is new in the matter of detail relating to breeding, rearing and developing the trotter, or to his use after being developed. Besides your own members, that are well versed in this subiect, I see other gentlemen about your table who have been eminently successful in their attempts to improve and develop the trotting horse.

It is, therefore, hardly incumbent upon me to attempt to enlighten you upon details which so many practical men who are present can discuss so much more authoritatively, but, perhaps, what I may have to say will serve to divert the subject of your discussion into a channel that may prove instructive as well as entertaining. I will, therefore, consider the subject only from a single standpoint, and that will be the status of the trotting horse as a breed.

While great interest is being taken, and large amounts of money invested in breeding the trotting horse in this country, and while great progress has been made in developing certain desirable traits or trotting proclivities, our trotting stock has not yet taken on the character of a distinct breed. Trotting stock is composed of anything and everything that can trot fast, or that can produce a horse that will trot fast.

While no distinct breed has yet been formed in the sense in which we speak of other distinct breeds of horses, such as the Percheron, the Clydesdale or the thorough-bred, yet there are certain strains of trotting blood which have acquired great reputation for imparting trotting speed when interbred among each other or when crossed with other strains of blood which are not generally regarded as of a trotting kind.

These recognized trotting strains afford a sufficient guarantee to the breeder that they will transmit a trotting proclivity to their offspring, to encourage the breeding of trotting stock on an immense scale. In order to enlighten themselves as to which strains of blood are the best to use for the production of trotters, a stud book has been established by the breeders for the recording of pedigrees, and in conjunction with this work an annual publication is made of all public trotting, and the best time made by each horse that wins a heat, if as fast or faster than 2:30, is also published with whatever can be ascertained of the breeding of each of the performers. The claims of each trotting strain, or family or horse, as the case may be, to public recognition are based upon the relationship of such strain, family or horse, to the records in this list of horses that have trotted in 2:30 and better—or as it is commonly called—the 2:30 list.

If, for instance, a stallion can show quite a number of his progeny in the 2:30 list and particularly if a good proportion of them have records near the faster end of that list, he becomes recognized as a valuable source of trotting speed. His undeveloped colts will sell better after he has made such a demonstration than before he had given this proof. If, before a stallion has been tried in the stud sufficiently to judge of his value as a sire, he has himself trotted well it is considered a highly favorable, though by no means infallible, indication that he will prove a good sire of trotters. What applies to the stallion in this respect also applies to the brood mare.

The marked success of any given strain of blood in the production of trotters is quickly noticed by every enterprising breeder in the country. As soon as it seems to be a decided success, a fashion springs up that makes a perfect scramble for the blood. There is no field of breeding that absorbs the attention of brighter, abler or more ambitious minds than the breeding of trotters. The rivalries are as great and the pride of success as great—perhaps greater—than in any other branch of breeding. Therefore if one strain of blood appears to afford any better chances of success than others it must be had at almost any cost. It is asserted that a young stallion recently sold for $105,000. Without pretending to vouch for the truthfulness of this figure, I can assure anybody who is skeptical of its accuracy that there is not the shadow of a doubt that if the horse lives and has his health he can, and no doubt will, earn $50,000 this present year in the stud. There is a gentlemen among your membership who, I see by the papers, has booked a mare to him for 1890. The service fee is $1,000. This may seem like a very liberal outlay, as the first item in the expense of raising a horse, and I think myself that if I were to undertake it, the chances are that it might be some time before I got my money back with interest; but if this gentleman's usual luck attends him I shall be surprised if he does not realize at least $10,000 some day for the $1,000 he now puts out. But if his investment should on this occasion fail, he can still fall back upon his other agricultural earnings. The pursuit of agriculture it has been said, is the most independent of all vocations, and as far as the saying applies to the horny handed grangers of the city of New York here assembled, I believe it is true. A farther instance of the popularity which special blood sometimes obtains occurred last March in one of our auction sales in this city, 24 head of colts and fillies nearly all yearlings and two year olds by one popular sire, brought an average of $3,773.96 each.

During the year 1889 a great number of auction sales of trotting stock were held throughout the United States. The more important of these were reported more or less minutely in the sporting papers and reached an aggregate of very nearly five millions of dollars. Hundreds of smaller auctions were not reported. I have no means of estimating the aggregate of private sales, but would judge that it must be far greater, in fact several times as great as by auction. Trotting horses are purchased for such a wide variety of uses that the private demand furnishes an outlet that relieves the necessity of sending any considerable portion of them to the auction ring.

Prices as I have before stated are greatly influenced by the fashions in blood, brought about by changes in the 2:30 list. It is evident that at no distant day a more discriminating list will be used as a standard. Some twenty years ago, before a 2:30 list had been compiled I set about getting the facts together. With the assistance of two or three friends we managed by our joint efforts to make a very complete list of all horses that then had records of 2:30 and better and if recollection serves me, there were less than 120 of them. So great has become the increase in trotting sport, and so great the improvement in breeding, training, &c., that last year over 800 new horses came into the 2:30 list, and probably this year a still greater number will take records. There are now over 4,000. This of course takes account of only such horses as go into public races and succeed in winning a heat or more within that limit of speed. There are now over 300 horses in the 2:20 list; more than were in the 2:30 list 20 years ago. The first trotter to beat 2:20 was Flora Temple who took a record of 2:19¾ in October, 1859, 30 years ago. She retired from the Turf in her old age with that mark as the fastest that had been made. Year before last, 1888, a two-year old took a record of 2:18—a point 1¾ seconds faster than Flora Temple, the old Queen of the trotting turf was able to accomplish with years of training.

This shows how much progress has been made in the science of breeding trotters in a period of 30 years. And yet as I stated at the outset our trotting stock has not yet taken on the character of a fixed breed and is still in the formative stage and the instance of this two-year-old proves it because though she is the greatest of her class she's but partly composed of standard trotting stock, her dam being a mare that was not of standard breeding.

In order to more clearly define the standing of different trotting strains with reference to others that are not as generally recognized as such, the breeders of the National Association, adopted a standard based upon the 2:30 list, by which animals are admitted to a preferred or Standard Registry. Horses can acquire admission to Standard rank under different rules relating to their ability to trot as indicated in public races, or their ability to produce trotters of public record as indicated by their career in the stud; or by inheritance from parents that are already Standard. Thus an animal may become standard by turf performance, by stud performance or by inheritance. The object of this standard was to gradually separate those animals whose blood showed the closest relationship to the 2:30 list, from the others. The standard rank therefore is an endorsement that the animal occupying it has proved himself by performance or is by inheritance supposed to be possessed of the trotting proclivity. The inference is that if we breed exclusively from parents that are standard animals, the trotting proclivity will be intensified and the certainty of breeding speed will be greater. This is the theory of a very large majority of breeders and up to a certain point I believe experience accords with the theory. If trotting stock had become a fixed breed, in the sense that the thorough-bred horse is, the rule would hold good, throughout, and the greatest performers would invariably be from parents on both sides that were standard animals. But as a matter of fact the greatest performers are not from parents that are both of standard breeding. The fastest trotter in the world is Maud S. 2:08¾. Her dam was not a standard mare until her offspring made her so by trotting fast. The next fastest trotter is Jay Eye See 2:10. His dam was not standard either by performance or inheritance. The next fastest is Sunol 2:10½. Her dam was not standard until her daughter's performance made her so. In all three of these cases, which are the fastest three in the world, the non-standard dams were half thorough-bred, their mothers being pure running-bred mares.

No breed created for the accomplishment of a specific object like speed at the trotting gait can be regarded as a fixed and distinct breed, until its members bred exclusively among themselves will produce animals that can accomplish the object more perfectly, than animals that are only in part of that breed. The trotting horse has not yet reached that stage. It is apparent that in some essential particular he is lacking of a quality necessary to achieving the highest speed which the thorough-bred can impart to him. As long as this is apparent he will continue to absorb thorough-bred blood until the deficiency is supplied. Having thus been bred up in that respect as he has already in trotting inclinations he will arrive at a point where neither the thorough-bred nor any outside source can supply him with anything superior to his own inherent qualities. The standard being meantime open to all animals that can meet its requirements in the way of speed, of course these part thorough-bred animals acquire the standard rank and by mingling their blood with the others tend to improve the breed. When in time, as with the thorough-bred horse, it proves that any outside blood is a detriment and never an improvement on the highest form shown by the pure bred, or as we may say standard bred, then and not until then can the trotter be regarded as an animal of distinct breed.

This is nothing against the useful tendencies ot the standard nor against the usefulness of the trotter. He fills his place splendidly and is thoroughly instated in the affections of the people. It only points out a way that will enable breeders to increase his capacity for maintaining high speed for a distance. That is what creates the stars of the trotting turf and fulfills the highest aspirations of the breeder.

There is no doubt that as time goes on and the trotting bred horse becomes formed into a fixed breed perfect in itself for the accomplishment of the highest achievements in the direction which is the accepted object of its existence, it will become the improver of all other breeds of harness horses. The carriage horse, the coach horse, the business horse and the horse of general utility will be improved by a cross of his blood, and he will usurp the usefulness of the thorough-bred in that particular and succeed to his title of "the blood horse."

Mr. Jay: Gentlemen—Among the guests whom we had hoped to greet this evening was Mr. C. J. Hamlin, of Buffalo, who has in his stables between three and four hundred horses, thorough-breds and trotters, of the most celebrated breeds, among them being three that, at three miles, are said to be the fastest in the world, and one, Belle Hamlin, that promises to be a prodigy. Much to our regret Mr. Hamlin has been unable to attend, but he has sent to us a short paper, which I will ask Mr. Bronson to read.

Mr. Bronson read the following letter and the paper accompanying it:

BUFFALO, N. Y., January 20th, 1890.

MR. FRANCIS R. RIVES, President,
8 Washington Place, New York City.

Dear Sir—Yours of the 4th instant reached me in due time. As I cannot accept the invitation to be present at the meeting of the Farmers Club, I avail myself of your suggestion and enclose you a short paper on the subject of the American Trotting Horse, which if you and your associates deem worthy, may be read.

Heartily thanking you, I am, yours very truly,

C. J. HAMLIN.

BUFFALO, N. Y., January 20th, 1890.

THE NEW YORK FARMERS:

Gentlemen—Nothing but pressing engagements could keep me from being present at your meeting to be held on the instant of the 23d, and, in response to your President's invitation, present a paper upon the subject of the American Trotting Horse. I assure you it is not from any lack of appreciating the honor conferred, when a number of so distinguished gentlemen issue an invitation to present a paper upon so important a subject, that will detain me in Buffalo on that occasion.

There can no longer be any doubt in the minds of honest thinking men that the breeding of the trotting horse is an American industry that has come to stay. The increasing importance of any industry can nowhere be more clearly shown than in the reports of its public sales, and certainly the lovers of the American trotter could not ask for stronger evidence than that afforded by this test. Not only has the breeding of trotters given this nation a new and important industry, but its influence has extended to the general purpose horse, and we already see a marked improvement in the form, style, action, intelligence and endurance of that animal.

These improved qualities surely enhance the intrinsic value of all horses, an item of no small importance when we consider its aggregate throughout the country.

The value of the American trotter is now becoming recognized throughout the world, and nearly every civilized nation is beginning to look to us for foundation stock. This foreign demand, if properly fostered, will surely prove of very great monetary importance, and, in time, enable this nation to get back the millions it has expended in importing thoroughbreds, Percherons, Clydes and coachers.

Though I have been engaged for some years in the breeding of trotting horses yet I am compelled to the conviction that it is still in its infancy. The foundation principle—proper infusion of different strains of blood—is only just beginning to be appreciated by the majority of breeders. There is no reason for believing that the development of the past 50 years has attained the highest degree possible in the trotting horse. On the contrary the past most emphatically points to a much higher development in form and intelligence, with greater speed possibilities.

The difference between breeding horses purely for speed, and breeding them with the idea of combining high speed with fine carriage and perfect form, is the point I wish to emphasize.

Far be it from me to under-estimate the speed value of that remarkable team, Edward and Dick Swiveler. When at their full speed nothing can be more exhilarating than to ride behind them, but this at the most is only for a moment. During the remainder of the drive their low heads, lack of beauty in conformation and style places them at a very great disadvantage when compared with a double team that combines all of these points, one that with heads and tails well up, furnish the riders with a constant source of pleasure.

The intelligent and progressive breeder must ever be on the alert sharpening his wits in his efforts to produce the perfect horse possessing beauty, elegance and style; one whose frictionless movements will enable him to trot a two-minute gait with greater ease than the trotter of 50 years ago in his attempts at a three-minute gait.

So much for the industrial phase of breeding trotters. But there is another phase, and just here is where the business has a very great advantage over most any other. It is not only lucrative when wisely managed, but it is capable of being conducted in connection with other business or profession in a way to furnish most desirable diversion and pleasure. I assure you, gentlemen farmers, that when you have succeeded in raising and developing a pair of the kind above described, and you invite a friend to ride behind them up the road, you will not only forget all your anxieties and troubles about vestibuled trains and Wall street deals, but will think the millenium has come, for you will be engaged, while taking this ride, in constantly cutting coupons from the pleasures of life, and my friend Farmer Depew—he is everybody's friend—will feel like saying about railroads what the Irishman said when the price of whiskey fell to seventeen cents a gallon, "Wather be d——d."

Respectfully submitted,

C. J. Hamlin.

Mr. Jay: We are favored to-night with the presence of a friend from Westchester, who is known to you all as a successful farmer, and a breeder of the finest Hampshiredowns in the State—(Turning to Mr. Hobart Warren.) I do not say the finest Southdowns. He is also the President of the Historical Society of Westchester, and, you will be glad to hear, has just been re-elected by a large majority the President of the State Agricultural Society. I have the pleasure of introducing to you the Hon. James Wood.

Mr. Wood: Mr. President and Gentlemen—I cannot for a moment imagine that I can say anything upon this subject that will be new to any about this table. Indeed I can only speak of it in the most general way. From my own experience I have no right whatever to give an opinion upon this subject, to be considered as the opinion of an expert. I quite agree with Mr. Hamlin in the statement in his paper to which we have listened with so much pleasure, that a great point to be gained in the breeding of the trotting horse is to have him something besides speedy—that he shall combine style, and what is known as *quality* with his powers of speed. There are very few breeders in this country, I think, who can speak upon this point with greater authority, judged by the success of his efforts, than Mr. Hamlin. But I want to say that, marvelous as have been the performances of the American trotting horse, he is to-day, in mental qualities, in character, and as a respectable moral being, fully up to the position he has attained as an animal of wonderful speed. If you will take a hundred trotting bred horses and a hundred horses of any other breed whatsoever, you will find less " pure cussedness " in the hundred trotting horses than in the other hundred horses, I care not whether they be cart horses or what. They are tractable. They have fewer of what perhaps some would call redeeming vices than any other horse. And I believe we are only on the threshold of the marvelous performances of this—if Mr. Kellogg will permit me—breed of horses. What is to be accomplished in the near future we cannot say, but it seems to me to be a certainty, if the past is any foundation for reasoning for the future, that we must expect to see the two minutes' point passed in the comparatively near future.

Mr. Kellogg has advanced a point upon which I wish to say a word, that the American trotting horse cannot be considered a breed. I do not know what Mr. Kellogg requires to constitute a breed. As to that there may, of course, be a very great difference of opinion. There is a great deal of force in his position, given by a number of considerations. For instance, the gentleman on my right, (Mr. Bruce) says that the American trotting horse had sprung from the loins of Messenger. Well, if that be true, then certainly we have a breed in the Messenger breed. But Mr. Kellogg can enforce his position by the statement, "Ah! yes, but you claim too much. The American trotting horse has achieved his distinction by the mingling of other bloods with that of Messenger. There is the strain of Clay blood, which sprang from the importation of Grand Bashaw into this country, the young Bashaw, Andrew Jackson, and Henry Clay, the father of his family." Mr. Kellogg may say " you have not established a breed, because the Clays come into this question, as a factor which must be taken into consideration." And then some say there are the Stars that have come from Imported Diomed, and therefore, you see, the Stars have something to do with it; there is no breed because of these facts. And Mr. Kellogg can enforce his argument by another consideration. There have come down to us from Canada, utterly unknown in their origin, the Pilots, and the descendants of St. Lawrence, and a lot of animals of unknown parentage, who have given us their marvelous performances. The position is certainly strengthened by such facts; and it may also be asserted with truth that many of those having Messenger blood have not shown speed, and therefore we cannot call them a trotting breed.

Mr. Warren will perhaps permit me to refer to his matchless Southdowns—prominent in this country, and equal to any across the Atlantic, whether those of the Prince of Wales at Sandringham or the most noted flocks of Sussex. If you should go up to his beautiful place on the Hudson and see his flock, at a time when Mr. Warren had not told the shepherd to put a few of them out of sight before you called around, you would see some animals that you would swear were not Southdowns. Will any one say that the Southdown is not a breed of sheep? There is just as much force in the argument in the one case as in the other. Let us look into this question, because it is an exceedingly important one, whether or not the American trotting horses form a breed. Mr. Kellogg on three or four occasions uses this language, "the trotting bred horse." What does the term "trotting bred horse" mean? It means that there is a breed of trotting horses. Let us see also what force there is in the statement of Mr. Bruce, that the American trotting horse sprung from the loins of Messenger. In all these cases to which I have alluded no great performer has sprung from any line of blood that has not had a Messenger cross in it. Let us see how it comes down? There was Hambletonian—Rysdeck's Hambletonian—a horse that had more crosses of Messenger blood in him than any other stallion of his time—or of subsequent times, so far as I am aware. We have in Hambletonian an illustration that there is a breed, and that the more of that breed you have in an animal the more sure is he to stamp his qualities upon his offspring. Let us go a step farther. What horse stands at the head of all the stallions that have ever lived in placing his "get" in the 2:30 class in any one year? It is a horse by the name of Egbert, a greater number of whose colts have this year taken a position in the 2:30 list than those of any other horse in the same time. What is the horse Egbert? He was sired by Rysdeck's Hambletonian. His dam was sired by a son of Rysdeck's Hambletonian. His grand-dam was sired by another son of Rysdeck's Hambletonian. And there you have crossing in a line, (or inbreeding, if you choose to call it so,) carried to a very great extent. Does not the fact that fifteen of Egbert's colts have gone into the 2:30 list prove that we have an American breed of trotting horses? To my mind it goes very far towards proving it.

What does this illustrate? It illustrates that there are strains of blood constituting a breed; and when you get to crossing in the line of those strains of blood you get very good results. It only illustrates what is familiar to all you gentlemen, in the breeding of all domestic animals, that when you make a cross in the line you intensify all the strong qualities peculiar to that line. If it be a kicking instinct, you will breed kickers. If it be a biting instinct you will breed biters. And so with any other quality. The history of the human race illustrates the effect of crossing in the line of blood just as does the breeding of short horn cattle or of any other domestic animal. What is it that places the Anglo-Saxon race at the head of the world and makes it rapidly dominate all other peoples? The effect of crossing in the line has produced the English people. The Dane and the Saxon and the Norseman, all of Scandinavian origin, came to that little Island at different periods, and settled there; and the mingling of their blood has been simply the crossing of the line in the Scandinavian stock and the Dane and Saxon and Norseman have intensified all the strong points of the Scandinavian character, and made the Englishman, and his son, the American, to dominate the world. Just so in the crossing of the line of blood of Messenger, there was produced Rysdeck's Hambletonian; and the crossing of the line in his blood again has produced the great results in our day.

So I think we have an abundance of evidence to show that we have a breed of horses. And there is a national feeling in this matter, and I, as an American, take pride in the fact that we have a breed of trotting horses. It is recognized in England, and all over the civilized world, that we have such a breed. The American trotting horses and the American merino sheep are the only distinctive types of domestic animals that this country has ever produced; and I am thankful that our nation has produced something distinctive in that line.

I want to say just one thing more, if you will allow me, in respect to the breed of trotting horses. We may all of us conclude, as doubtless many of you have concluded, that we are going to breed a fast trotter, or, perhaps, a score of them; and I hope you will all try to do it. There is lots of fun in the attempt, even if you do not succeed. If you do not develop great speed, you are all sure of developing some pleasure. No man ever bred a trotter but knew speed was there, only somehow he had a little trouble in getting at it. You all know that "Full many a gem of purest ray serene," &c., is in your stable of trotters. But, gentlemen, this thing has been very conclusively proven quite recently; and that is, that for a phenomenal trotter two things are essential. First, a horse; second, a man. And the man is just as essential as the horse. First, you must have the horse that has the speed in him. Second, you must have the man who can get the speed out of the horse. And you may as well be without the one as the other, so far as getting phenomenal speed is concerned. Look at Axtel--a phenomenon! Well, Williams, his breeder and trainer is just as great a phenomenon as Axtel. And if I—I will not say, any of you gentlemen—had bred Axtel, perhaps he would take me over the hills to Mr. Jay's farm, to make a call, at the rate of seven miles per hour; or he might be plodding down to the station with me in the morning, and take me back again in the afternoon; for neither I nor any one about my whole establishment would have the genius to develop his great powers. It is the genius that does it. You cannot learn it. The genius must be in you, and if it is in you it will do the work. So that to produce a phenomenal trotter it is just as necessary to have the genius in the man as to have the blood in the horse. Therefore it is that we may expect to see in the future the successful breeding of trotting horses confined to great establishments, where large capital is employed, and where professional trainers, who have shown that they have the genius to develop the speed in horses, will be employed for this very purpose. In those large establishments, if an animal is found who has not the promise of speed, he is at once taken away; and expense is only incurred in developing those animals who have speed in them.

I very much hope that gentlemen belonging to your organization may be successful in the production of phenomenal trotters. If, however, you are not, and you breed in the lines that have been indicated here to-night, you will be quite sure of getting very useful and delightful animals for your service and your pleasure.

Mr. Jay: Among our expected guests was Mr. Bonner, who, you all know, is the most skilled and princely purchaser of celebrated trotters in the world. Among the other famous horses that he has owned have been the gray mare Peerless, Dexter, Maud S. and Sunol, the latter bred by Senator Stanford of California, and showing the last degree of science reached in the West in the breeding of animals, a subject to which Mr. Wood has so cleverly referred. Mr. Bonner had expected to be with us to-night. He wrote me this note this afternoon:

"8 West 56th Street, January 23, 1890.

"Hon. John Jay.

"My Dear Sir—I regret to have to inform you that I have been confined to my house since Monday with the prevailing influenza; so that it would be very indiscreet for me to go out this evening. I am obliged, therefore, to deprive myself of the pleasure of meeting the New York Farmers on this occasion.

"The paper which I have prepared I send herewith. If you deem it of sufficient interest you can have some one read it, or any part of it. I am so hoarse that I could not read it myself even if I were able to go out.

Yours very truly, Robert Bonner."

Mr. Bonner's paper will now be read by Mr. Barnes.

Mr. Barnes: I take it as a great honor that I am permitted to read the very interesting letter or address which Mr. Bonner prepared for this meeting.

### Mr. Robert Bonner's Paper.

Gentlemen—A few days ago I was informed that the topic for discussion this evening would be the "Trotting Horse," and I was kindly invited to give some results of my experienee on that subject. At first, although I deemed the invitation a high honor, I declined, for the reason that I have no gift whatever as a public speaker. Besides, I was reluctant to appear before so distinguished a body as the New York Farmers, and attempt to speak to them on any subject, even on one of my hobbies, the trotting horse. But your president, Mr. Rives, and your vice-president, Mr. Jay, were so very persuasive in repeating the invitation, at the same time considerately suggesting that I might read a paper on the subject, that they overcame my scruples, and I concluded to comply with their request.

The swift trotting horse is distinctively an American outgrowth or development. His performances are so extraordinary as to excite the wonder and admiraton of the people of other countries, and here in our own land he has become a necessity to many men of sedentary habits—men who must have outdoor exercise and breathe fresh air if they would preserve their health; and whether they seek the pure air and the exhilarating exercise on horseback or in a trotting-wagon makes but little difference. It is a mere matter of choice between the two modes of recreation.

The first horse that I ever owned was purchased for me by our family physician. That was in the summer of 1856—over thirty-three years ago. At that time I had been working hard, fifteen or sixteen hours a day, and was on the point of breaking down under the pressure when I called in our good doctor, who, fortunately, was an intimate personal friend. His first remark was: "You are confining yourself to closely to business. My advice to you is, get a horse and come out every morning with me, and take an hour's exercise on horseback. It will do you more good than all the medicine I can give you." I knew nothing about horses then, but replied: "Well, Doctor, if you will select the horse, I will pay for him." He did so, and we went out together once or twice, but the exercise was too violent for me, and, for that reason, I bought a wagon, which suited my condition better. The doctor's prescription, I assure you, agreed with me, and I faithfully followed it, taking the medicine without making a single wry face. I need hardly add that he was an allopathic physician, for I think it is pretty well known that I have taken his prescription in allopathic doses.

About twenty years ago, I was at a reception at Princeton, New Jersey, where I met Dr. McCosh, the distinguished President of the college, the late Dr. Hodge, the eminent theologian of the Presbyterian Church, and other clergymen of note. A short time before this, by the way, I had given Dr. McCosh a ride behind one of my swiftest horses; and on this occasion he spoke of the circumstance to several of his brother clergymen. They naturally asked me some questions about the trotting horse, when one of the brethren intimated that it was rather an extravagant pastime to own so many costly horses. I replied, indirectly, by asking Dr. McCosh this question: "Did the Almighty ever make anything for the use of man of which man is bound to use a mean specimen when he can honestly afford to use a good one? If he did, then it logically follows that all you clergymen ought to be confined to broken down, spavined and foundered horses." Dr. McCosh replied playfully: "Perhaps a theologian, like Dr. Hodge here, can answer that question;" and then he added with more earnestness: "Mr. Bonner, so long as you do not bet on your horses your position is as firm as the everlasting hills." I flattered myself then that the friends of the trotting horse had gained a point in that stronghold of orthodoxy, where in former days a man who owned a good horse was considered to be on the sure road to perdition. But the world moves.

The late Mr. Garrett, President of the Baltimore and Ohio Railroad, was one day at my stable, in company with a prominent merchant of this city. After looking at the horses, and discussing the merits of the various breeds, Mr. Garrett expressed the opinion, in which I concurred, that a breed of horses could be raised capable of hauling a street-car from the Astor House to the Central Park in ten minutes less time than it takes ordinary horses to haul it, and with even more ease to the horses. He quoted Dean Swift's remark that the man who makes two blades of grass to grow where only one grew before is a benefactor of his race, and followed it up with an argument to the effect that the man who could lessen the time consumed in going from the upper to the lower part of the city would be entitled to equal distinction. This can be done if our farmers—I am not speaking of New York Farmers, but of farmers generally—could only be induced to raise more highly-bred horses; and this brings me to the point in these desultory remarks that I would like to emphasize, namely, the necessity of a greater infusion of thorough-bred blood into our trotting horses if we would continue to hold the pre-eminence in the trotting world and be able to still lower the record. The fact that the grand-dams of the three fastest trotting horses that have yet been produced were strictly thorough-bred, speaks volumes in favor of this infusion. The late Robert Alexander, of the famous Woodburn farm, did a great deal towards encouraging it in Kentucky, and Senator Stanford, of California, is doing still more. One reason why I would urge the closer engrafting of thorough-bred blood upon our trotting stock is that wealthy men in South America, and in different parts of Europe, are buying some of our trotting stallions and trotting mares, and there is no telling what they may not be able to accomplish when they come to cross them with their native stock. The Canadian horses have pure trotting action, and some of them have great speed, but they are unable to carry that high rate for a mile. Thorough-bred blood is essential if you want to raise a world-beater. But it is not every thorough-bred mare that is adapted to cross with the trotting horse. My experience and observation lead me to believe that short-bodied, compactly-built mares will not answer. We must have what are called roomy, lengthy mares, with short cannon bones in front and hocks let down behind, to get trotting action. Has it ever occurred to any of the gentlemen present why it is that the elephant never trots? No one has ever seen an elephant trot; and in my opinion no one will ever see an elephant trot. He always walks or paces. Why is it? Simply because his body is so short compared with his height that he could not strike a trot without hitting his forward limbs with his hind feet, and in order to avoid doing so he is obliged to take the side or lateral motion. We can get a valuable lesson from the action of the elephant in selecting thorough-bred mares to breed to our trotting horses. Short-bodied animals will not answer.

One of my hobbies is the horse's foot. I have made something of a study of it; but I do not propose to weary you with any very lengthy remarks on my favorite theme. I must say, however, that I know of nothing in any way connected with the horse which is so imperfectly understood as the horse's foot, especially the mechanical effect of an unbalanced hoof on the articulation of the joints of the entire limb. I do not refer to the lack of knowledge on this subject among our grooms or our blacksmiths alone, but among our veterinarians and even the professors in our veterinary colleges. Let me give you an instance: No man in his profession outranks Professor Williams, the principal of the New Veterinary College at Edinburgh, Scotland. He has written two works—one on Veterinary Medicine and the other on Veterinary Surgery—which are used as text-books in veterinary colleges on both sides of the Atlantic. On page 318 of his work on surgery, he gives an engraving representing the displacement of the bones of a forward leg when their position is altered by a thick-heeled shoe. In a letter that I wrote to him in October, 1877, calling his attention to this mistake, I ventured to say: "If you will excuse me for being so emphatic, it is utterly, absolutely impossible for a thick-heeled shoe to produce any such effects. A thin-heeled shoe would have that tendency, but not a thick one. If you will take the coffin-bone, the lower pastern and the upper pastern bones, placing them in position on a table you will find that by elevating the heels or wings of the coffin-bone you necessarily depress or lower the ankle, which is not pushed upright as if there were no articulation in the joints. The effect on the pastern bones of elevating the heels, so far as I know, has never been understood by veterinary writers. I have read everything I could find on this subject and have never seen it mentioned in print. This is a matter of experimental knowledge with me, for I have tested it over and over again. Its bearing on the treatment of sprains of the suspensory ligament, the flexor and extensor tendons, navicular disease, etc., I will not dwell upon in this note."

Professor William's reply to this letter I will read to you:

"THE NEW VETERINARY COLLEGE,
"EDINBURGH, November 7, 1877.

"ROBERT BONNER, Esq.

"DEAR SIR: I received your letter of October 22, with very great pleasure. I am always open to conviction and shall put your very ingenious conclusions to the test and let you know the result.

"Yours very faithfully, W. WILLIAMS."

In a subsequent letter he wrote: "I quite agree with you that the mechanical effect of raising the heels is to increase the obliquity of the pastern. * * * I thank you very much for having called my attention to this matter."

I will close these remarks by giving you a case nearer home. I have known Dr. Lewis A. Sayre, the eminent surgeon, for nearly forty years. He came to my house one evening to talk with me about one of his favorite mares that was lame. He had sent her, for treatment, to a well-known and highly educated veterinary surgeon, whose name, for obvious reasons, I will not give, and who, after examining the mare, sent the doctor a letter, in which he informed him that she had navicular disease and advised him to sell her. As the mare was a present to him from some gentleman at the South, the doctor would not part with her; but I will let him tell his story in his own way, as I have it in his handwriting.

"On the 8th of January, 1883, Mr. Robert Bonner advised me to take my mare, Fanny Miller, to his blacksmith, David Roberge, to be shod, as he thought she did not have navicular disease, but that all her difficulty was in not having her feet properly balanced. Mr. R. removed her shoes, prepared her feet, and re-set the shoes. She travelled quite freely immediately after, and has worked nearly two hours without showing any lameness.

"January 8, 7 P. M. L. A. SAYRE."

On January 9th he writes: "I drove Fanny for two hours with more pleasure and satisfaction than I have had for the past year. She seems delighted, and steps with pride."

He drove her on several other occasions, with equally satisfactory results, and closes his statement with this memorandum:

"January 14th, 1883—Drove Fanny and mate to sleigh at good speed to Home of Incurables, Fordham, and back, without the slightest limp or sign of lameness; and I therefore conclude that she could not have had an incurable navicular disease."

Remarks were also made by Rev. Dr. Eliphalet Potter, of Hobart College, Mr. Choate, and others; and a vote of thanks to the guests who had entertained and instructed the "Farmers" upon the subject under discussion, was moved by Mr. Appleton, and carried unanimously; after which Mr. Jay declared the meeting of the "Farmers" adjourned.

# The

# "New York Farmers"

MET again on February 27, 1890, at "Sherry's," Mr. Francis R. Rives presiding.

In opening the proceedings, Mr. Rives said: Gentlemen—It was not my fortune to be present at the last meeting of the "Farmers," but I understood it was then suggested that the subject for discussion on this occasion should be "The Future of American Agriculture." The subject was so large that we could not, on short notice, find any experts disengaged who were big enough to treat it adequately; and consequently, with the approbation of the officers and of a good many other members of the New York Farmers, who were consulted, the subject was changed to "Landscape Gardening."

Every gentleman who lives in a country house must think that landscape gardening as an art is the necessary handmaid of architecture. With well placed roads, well kept lawns, and trees judiciously disposed and grouped, very beautiful effects may be produced.

In reference to the disposition of trees I should say that I am inclined to think that the American varieties, with rare exceptions, are greatly superior to the European, and much more worthy of cultivation. I think, too, that the well-to-do farmers of this country generally make a very great mistake in planting their trees too close to their dwellings. Shade is a very good thing; but certainly sunlight is also to be desired. But there is another kind of landscape gardening, much more ornate and costly and purely decorative, which attracts the attention of the world to-day.

In the department of decorative gardening the whole universe is ransacked for plants, not always beautiful in form, but generally gorgeous in color, which have often to contend against our hostile climate and be protected to show themselves out of doors for a few months.

We have present with us to-night a gentleman who is charged with the development of our Central Park; and a most beautiful park it certainly is. I think that any one returning from Europe and seeing it in the latter part of May or the beginning of June must be struck with it beyond measure; for it combines, as Washington Irving used to say of the scenery of the North River Valley at that time of the year, all the verdure of England, with a certain tropical grandeur of its own.

Mr. Vaux is well known to all of you. He has promised to begin the discussion this evening by commenting on the true use of the much abused and misapplied word "picturesque." We shall be very happy to hear from him.

Mr. Vaux: The word "Picturesque" has, I think, one obvious limitation, that may be mentioned at the outset. It must refer to something that could be represented in a picture.

In the water-color exhibition, now open, one painting is called "The Lisp of Leaves."

This does not seem a well chosen title, and, on reading it, I was reminded of an experience I had. Some years since, while making a sketch of a village church, in the old country, one of the villagers (who came to look on) remarked that he wished I could have drawn it when the bells were ringing.

I remember, at one time, pointing out to a friend, who was fond of shooting, what seemed to me good low-toned painting in an artist's study of a copse, and I asked him if he saw anything in it. He said that if he went round "that point" he should certainly see woodcock in it. The word picturesque can, I think, be correctly applied to any work of a landscape character, whether it be large or small, simple or elaborate, formal or informal, on the one condition that it be so conceived as to justify its selection as the subject for a picture. The landscape painter has the whole of nature to choose from, and he observes and rejects, until he comes upon some natural scene, that happens to attract him, and also to be harmoniously arranged with reference to the powers and limitations of the human eye, to which he makes his appeal; a pictorial composition being manifestly unsuccessful, until it has enough unity and enough variety to make it attractive when looked at. The eye of an observer, who is not a painter, is free to rove over actual scenery, and is able (with the aid of his memory) to co-ordinate, mentally, a series of impressions that will be true, individually, and agreeable as a whole; but the painter has to select one combination- and his composition is, therefore, made satisfactory by a thoughtful omission of what is not essential to a favorable expression of the general sentiment that he is attracted to, and by a careful addition of anything that might naturally have occurred in that particular place, which will help to emphasize the leading idea he is trying to bring out.

The painter is also limited to his square of canvas, and must get all that is needed for perfect balance within these constructed dimensions.

S. R. Gifford once told me of a remarkably skillful painting of a landscape that he had studied to advantage. It was by a Frenchman, and the subject was broad open hill-side, broadly illuminated with a number of sheep (on which the light also fell) scattered over it. The special skill was shown in the introduction of a black sheep here and there, which, although illuminated, helped out the general scheme of light and dark in some way that Gifford did not explain exactly, but for which I was willing to take his word.

The landscape gardener, has, of course, a wider margin of frame and a little more scope, as he can reckon on some variety of position to be assumed by the observer of his effects. Still his freedom in this direction is not great, and he needs, in another way, the capacity of the landscape painter to see what is agreeable in nature, and the skill to reproduce it with a simplicity and directness of purpose and concentration of aim that teaches him how to leave out the incongruous and to emphasize the essential.

If the word "Prospect" is used in ordinary conversation, it seems to suggest some bold opportunity for incidental overlook, some view, of a scenic character, that is refreshing to the eye through its extent, and from its suggestiveness of freedom, without much reference to its completeness as a landscape composition. It may have an unattractive, and even ignoble, immediate foreground, and yet may satisfy the legitimate craving we all have for grandeur of outlook, and be more soul-satisfying than a better balanced composition of narrower scope. Landscape gardening can furnish any noble prospect with a comparatively noble foreground, and the result, without being less refreshing in its suggestion of freedom and expanse, will be more fit for selection by a landscape painter as a subject for an attractive, well-balanced picture. In such a foreground there must, of course, be some connection, and also some contrast, or the appearance of a map will be suggested by the prospect; and this is always felt to be an undignified idea, on which the mind of an observer should not be allowed to dwell. Each composition should have a beginning, a middle, and an end to it—telling its own story so connectedly that the whole result will leave a general impression of unity.

A shaft, with cap and base, is called a column, and any combination (made up of natural growths) that has an evident foreground, middle distance, and distance may, I think, be fairly called "a landscape." In any such composition the first necessity for success is a recognition of the fact that there is need and opportunity for an artistic combination of lines and colors, wherever natural growths are developed under human control; and the second is, to get rid of the idea of individual aggrandizement of special features in an insubordinate way. One of the most difficult problems to-day is the legitimate use of leaf plants and flowers in lawn planting or home landscape gardening. It seems clear that they are too good to lose, and equally clear that they are too loud and demonstrative to be easily handled. What Whateley calls the sprightly verdure of the greensward may, perhaps, be superseded some day by green things that grow naturally, like mop or periwinkle, without being cropped or mowed at a sufficiently low elevation to suit the eye as a ground work; and if any of these should happen to have a suggestion of something besides green in its make up, (such as the reddish alternanthera,) and show a capacity for dwarfing, why so much the better, in my estimation, for the landscape gardener, who will have a hint for a color contrast, the legitimate use of which may, perhaps, be learned in the good time coming, as seems to be the case already with the purple beech, which is better appreciated now than formerly. Success in planting depends entirely on what you are expecting to raise, and who are to be your customers. To the color loving landscape gardener the unplanted flame colored poppies in an open field seem to be a definitely valuable part of the crop, but he would hardly expect the farmer to agree with him. The aster, growing wild everwhere, flowers so freely that it often gives the effect of an irregular purple border.

Some other wild plants, in their season, flower so profusely, that (without any sense of garishness) the eye is filled with bright colors that are quite as positive as those produced by our much used and much abused friend Colens. It seems to me, therefore, that in the manifestly overdone foregrounds that we meet so frequently in these days, the offence to the eye must be in the unpicturesque formality of the treatment, not in the picturesque splendor of the color.

In a lily pond the opportunity exists for the artful pre-arranged combination of beautiful stem and leaf forms, of almost every variety of lushy green tint, with emphatic contrasting spots of red or white, blue or yellow, in some agreeable flower shape. We have also the sparkling brilliancy of the water, with its mirror like reflections of these manifold lines and hues. Fortunately, it does not require an extensive area to show a lily pond effect to advantage. A city basin, of the size of that in Union Square, seems to be quite large enough to get good results in, and any combination, however successful and fascinating, has the tantilizing suggestion that a true master of the laws of composition that are latent in the words light and dark, length, breadth and height, proportion and gradation, contrast and emphasis, would produce a more artistic effect of form and color from the same materials. Of course we all agree that simple, broad, meadowy landscapes are the best, and that they are well calculated to make appeal through the imagination to the nobler part of man's nature. The landscape gardener recognizes, however, that the breadth of each meadow can be expressed in figures without hurting its lanscape effect, and also that its surface will not continue to present a meadowy appearance unless it is pastured or lawn-mowed.

The idea of pastoral tranquillity can hardly, perhaps, be conveyed as perfectly by meadows that are inclosed, as by those that are not; but if stone fences are used their lines play into the lines of the scenery so easily that they do not seem to give much trouble to the lanscape loving painter, who, at the outset, naturally chooses somewhat irregular ground for his picture.

Experience shows, in this country, that interior roads can be well constructed and maintained by co-operative effort. It is, moreover, easy now to foreshadow that (in America) this kind of co-operative effort will soon aim to secure picturesque embellishment of a high character, as well as road construction of a high character, in the common public thoroughfares of the country.

Roads that cross each other squarely do not seem to cut up property to the best advantage, and if the lines of intersection are planned to come together at a more obtuse angle (that of the hexagon, for instance), the invitation to a change of course is clearly enough indicated, and the opportunity for choice in direction is more picturesquely emphasized. The ideas suggested by the words ante-park and park-way grow easily out of our complex rural experiences. That belong as naturally to farms and country places as to public or private parks, and mean simply that opportunities for a picturesque arrangement of planting exist and should be taken advantage of wherever main entrances occur, and on exterior roads of approach whenever suggested by the lay of the land and the love for the picturesque of those who control them. A well known painting by Sir Joshua Reynolds gives fine views of the same childs head, each view being a delicate profile, three-quarter or full face, that has a separate fascination of its own, while the whole result produced by grouping the five together in a complex way is a quotable illustration of the comprehensive meaning that I should like to see attached to the word "Picturesque." One can easily conceive of five wild roses growing on a single stem in some such harmonious way, and making an attractive composition of similar objects nearly on the same plane that a flower painter would like to perpetuate.

Mr. A. J. Downing would sometimes invite a few friends who might be staying at his house to accompany him on his morning walk through his green-houses, which were no larger than was necessary for home use, and for such purposes of experiment as (for the time being) happened to interest him as a lover of plants and as a recognized authority. While the walk was in progress he would clip a bud here, a blossom there, a leaf spray elsewhere, and by the time the little tour was over he had a delicately conceived and what I should call a picturesquely contrasted floral memento in his hand, that he was ready to present to any lady that might be of the party.

In some of the later numbers of Garden and Forest are to be found accurate drawings, nearly on the same plane, of individual trees, in groups of two or three, with views in the middle of the illustration of similar trees at a sufficient distance off to be diminished by perspective and generalized by chiaroscuro. This not only adds attractiveness to the drawing, but serves to exhibit fairly whatever picturesqueness of a landscape character there may be in the tree.

To sum up what I want to say in a few words, I desire to point out, not only that we have good use for the phrase "A love of the Picturesque," but also that we mean by it something more general than a love of pictures, and more specific than a love of the beautiful. I will close with an illustrative quotation from Downing, who says: "There is, perhaps, something a little exclusive in the taste for some of the fine arts." A collection of pictures, for instance, is comparatively shut up from the world in a private gallery; but the sylvan and floral collections, the groves and gardens, that surround the residence of a man of taste, are confined by no barriers narrower than the blue heaven above and around them. The taste and the treasures gradually, but certainly, creep beyond the nominal boundaries of the estate, and re-appear in the pot of flowers in the window, or the luxuriant blossoming vines which clamber over the porch of the humblest cottage by the wayside.

Mr. Rives: Some unexpected accident has deprived us of the pleasure of the company of Prof. George Lincoln Goodale, of the Botanical Garden at Harvard. But from the same portion of the world we have, I am glad to announce, a gentleman whose family name has long been distinguished in the annals of this country, both in art and in science, Mr. Ernest W. Bowditch. His presence affords us great pleasure. He will now give you some of the results of his experience, which has been very large, in the laying out, management and decoration, in the way of landscape gardening, of private estates as well as public grounds.

Prof. Goodale: It is a little difficult, at any time, to prepare a professional paper to read before a Farmer's Club—particularly a short paper that should be of general interest for the constant tendency is to amplify, in technical ways, to such an extent as to become tiresome.

As I have not time to read a treatise on landscape gardening this evening, the talk will be upon the re-arrangement of a New England farm, using as an example, a problem that has come up in my practice, and where work has been carried on for a series of years under the direction of my office.

To explain the text more thoroughly, a few drawings have been made, showing the arrangement of the property when it was first looked over, and its present condition. With this as a basis, it is proposed to explain, briefly, the process by which the changes have been effected.

In the consideration of a problem of this nature, the points to be kept in view, and the order of their importance, may be as follows:

*First*—The size and outline of the property.
*Second*—The best location for farm buildings, both as regards aspect and general convenience.
*Third*—Water supply and drainage.
*Fourth*—Re-arrangement of fences and walls to better suit the new conditions.
*Fifth*—Re-grading, where needed, for utility and appearance.
*Sixth*—Planting, both of useful and ornamental material, painting of buildings, etc.

The original estate, when acquired by the present owner, was neither of good shape, nor economically nor conveniently arranged. At one time it had been partially under-drained by small tiles, but, either the scheme of drainage was only carried out in part, or the execution or planning of the work had, one or both, been faulty; for, when examined, but few of the drains were found in working order, and the land they were intended to serve was very wet and the soil sour.

The buildings and offices were ill-arranged, dark and wet, while the kitchen sink-drain fouled the well from which the drinking water was obtained.

The mansion, which also served as a farm-house, was tumbling down from decay, hastened very materially by a water privilege in the cellar and a leaky roof.

Fruit orchards and ornamental grounds had received no attention for years, while the small fruits had wholly disappeared, and the flower-garden, once blooming with Parrot Tulips and other old fashioned favorites, was distinguishable from the surrounding ruin only by ragged remains of its once trim box borders.

There was little or no system in the arrangement of the fields, there being many unnecessary and useless walls and fences, which rendered the farm difficult to handle and unsatisfactory to maintain.

The soil on the farm is a stiff retentive clay, and the general character of its service would be called "undulating," and wet.

The first plan is merely an outline of the orginal property, showing how irregular and inconvenient its boundaries were. Figures 1 and 2 represent outlying tracts of different ownership, that seemed to be desirable to acquire in order that the property should be more compact, and in order that certain drainage areas should be under one control. These outside areas were, accordingly, incorporated in the farm, and plan No. 2 represents the outline of the estate as it is to-day, with these additions.

The property, as now arranged, presents a tract which is compact; not so large as to be cumbersome, or burdensome in any degree, and yet, not so limited in acreage as to render the necessary farm buildings either absurd, or even strained.

To consider it further in detail a topographical survey was made covering those areas upon which work was contemplated. This plan, as drawn, shows, at a glance, the differences of elevation, by contour lines one or two feet apart vertically; the overhang of the branches of all the principal trees, the location of all buildings, fences, walls, brooks, ponds, drains, etc. With this survey, it was entirely possible to figure, with reasonable closeness, the cost of any and all work that might be desired.

Having obtained the shape and area desired, and the topography, the best locations for the farm buildings, both as regards their aspect and general convenience, are to be considered. Usually, a point near the geographical center of the farm is most desirable; but, in this instance, the old buildings, taken in connection with the ornamental grounds, prevented, in a great measure, the selection of locations materially different from existing ones. Therefore the attempt was made to so remodel the farm buildings and their relations, one to another, as to render them more convenient, grouping them together in such a way as to be more pleasing to the eye, and giving them a better aspect—and be satisfied with that. New farm barns were built, and the old ones were either entirely destroyed or remodelled for other purposes. The old house was retained, with additions, but every other building was changed in position or outline, as will be seen by the accompanying drawing.

Under the old arrangement, the fronts of the buildings and yards were exposed to the bleak northwest winds, which was very undesirable, while now the barn yards are to the south and southwest.

As before stated, the kitchen sink-drain ordinarily fouled the drinking supply. This trouble was removed by locating the sink-drain elsewhere, and the top of the well was made tight to prevent the entrance of surface or ground water. The well was then thoroughly cleaned, and, after some little time, the water proved to be of satisfactory quality again for domestic use. This supply, which was hard, has been supplemented by the building of large cisterns to take rain-water from the roof of the barn; and, although the total water supply is not, at the present time, satisfactory, it is perhaps sufficient for the present needs of the establishment.

The drainage of lands, where needed, is carried to a depth, if possible, of four feet or four and one-half feet. Formerly such drains were made with agricultural tiles, but in doing such work it is to be remembered that all such drains are merely filters, and all filters eventually clog and become useless. It is becoming the custom now to build what are known as French drains, rather than the old agricultural drains, because they give far better results, and, ordinarily, utilize all the loose stone that otherwise might be difficult to get rid of; then they do not clog or become troublesome until many years after the others have ceased to be of value.

The tile at the bottom of the trench is of second quality of glazed earthenware, laid with open joints. The carrying capacity of glazed pipes is somewhat greater than the corresponding sizes of agricultural pipes, as there is much less friction to be overcome. They are, therefore, better, and the first cost of the pipe is no greater. Besides this, the whole ditch, when arranged as a French drain, acts in the same way that the agricultural pipe does in drawing water to it, and the surface area is enormously increased.

The interior fences and walls have, for the most part, been wholly removed, and, in place of them, hedges, with temporary fences of ribbon wire, are to be seen wherever the new boundaries of fields are determined upon. Many fields have been consolidated, so that now there are but 10 fields where there were orginally 25.

The material in the old walls, when not needed for the outside boundary on the estate, or for foundation walls or drains, has been put into farm roads which now connect the various fields with the farm buildings.

The substitution of the hedges for walls is a desirable one, occupying less land, and making the fields larger; while it removes entirely many fences that were formerly expensive to maintain.

The planting of hedges and setting up of wire fences makes it possible to change the positions of field boundaries easily and quickly, if desired.

The fifth question in importance, is what grading may be needed, either for utility or appearance. In this problem, the surface water off the public road on the east of the estate ran over the land along the front, making it wet and soggy at all points near the road. By changing the grade to a moderate extent on the road, and by carrying the surface water in proper underground drains, the approach to the place was very much benefitted, and the land next the road rendered valuable, where it was formerly of little account. Practically, there was no further re-grading, except in the vicinity of the farm barns, where the surface, in every case, was so arranged as to throw the water from the buildings.

*Sixth*—The planting, both of useful and ornamental material, painting of the buildings, &c.

The orchards have yet to be remodelled, but the proposed changes are not difficult to understand. There are many old apple and pear trees, still in vigorous growth but sadly in need of pruning and general care. These produce almost exclusively winter fruits, and it is proposed to graft them so that there will be both early and late apples and pears, and, further, to supplement them with peaches, apricots and plums. There being many old ornamental trees on the estate near the house, the planting has been thus far confined to filling in of gaps where plants have died, and in such an arrangement of dwarf trees and plants as to separate thoroughly the ornamental grounds from the farm. Of flowers, in the ordinary sense of the term, there will be none, but, in place of them, masses of well known perennials and flowering shrubs and trees that are perfectly hardy and that only need, in shape of care, the pruning knife and shuffle hoe.

A place that is seen only in summer is comparatively easy to arrange, when it comes to planting, for deciduous and evergreen growth are both available, and unpleasant and uninteresting objects can be masked in from one to two years. It is not so, however, with a property that is liable to be visited during the cold months, when the foliage is off of all deciduous growth. It is possible, however, even on such a place, to make arrangements of evergreens, and of such deciduous trees and shrubs as have handsome bark and much fine growth of hard wood twigs, so that the result is pleasing in every case, and you can also obtain excellent effects of color and of distance by the exclusive use of different colored evergreens, so as to make comparatively limited areas seem quite large.

The proper order for farm buildings is largely matter of individual taste. With a personal fondness for inconspicuous, browns, reds or grays, it is undoubtedly true that occasionally a cream color or something even more startling sometimes is very attractive.

In the case before us the colors selected for the buildings were corn color, with white trimmings, which are very satisfactory, though possibly an indian red would have blended rather better with the surroundings.

It is safe to say that when any landscape gardening work is to be attempted the best results are obtained where a general scheme that has been thorougly studied is mapped out in advance, and certain definite work entered upon only after the preparation of proper estimates. Few things cost more money than moving earth or ornamenral planting on a country place, whether a farm or otherwise, and without one is familiar with the probable cost in advance, all such work had best not been attempted.

Mr. Rives—I think we shall now have to call upon an artist of this society, Mr. C. M. Depew. His initials have been interpreted lately to signify Columbus Magician. With the flower of rhetoric, he can paint a scene as picturesque as the one so well described by Mr. Vaux.

Mr. Depew—Mr. Chairman and gentlemen: I am glad we have at last found a man who understands this question.

If there is any one thing more than another which distracts the attention of a practical farmer, and depletes the finances of an amateur farmer, it is landscape gardening. The practical farmer does not know anything about it, and the amateur farmer knows less. Landscape gardening is something that a man born in the country never undertakes. Landscape gardening is the thing with which a man born in the city, who buys a farm, instantly begins. The result is that the man, born in the country, who comes to the city, makes a fortune, goes back and buys the old homestead, retains whatever he has earned, accumulates, and leaves it to the satisfaction of his heirs. The man, born in the city, who has accumulated a fortune, goes to the country, buys a farm, undertakes landscape gardening, and his assets are not satisfactory to his heirs. And the simple question, in a matter of this kind, is whether a man lives for himself or his posterity?

For the first fifty years of this republic, I think it may be stated historically, we had no such thing as landscape gardening. I think the gentleman from Massachusetts will bear me out in that statement. We had no such thing. There was a general waste of stone fences, of apple orchards, (or peach orchards, as long as they existed,) of forest, from which the farmer got the wood which furnished his fuel, of fields upon which he pastured his stock; and that was the limit of his landscape gardening. Then the time came when the farmer's boy went to the city and accumulated a fortune in dry goods or woolens, as the case might be, or to the Pacific Coast and struck a mine, and brought home something rich; and the principal object he had in going back to his native place was not so much to gratify a "taste," for he had none, as it was to astonish the neighborhood. And he immediately indulged in landscape gardening. Now, his only idea of landscape gardening was something that he had read about an Italian garden. So he proceeded to lay out the ancestral farm, and such acres as he added to it,—and he always insisted that the added acres were a part of the original farm, which the poverty of his grandfather, prior to the Revolutionary War, compelled him to part with. As I have said, he added to the acres of his ancestral farm another farm, and upon this he carried out his ideas. He employed a man, whose language he did not understand, and about whose ideas he knew nothing. This man was usually an Italian, who played upon a guitar in the evening, and in the day time directed a vast body of men who were paid by this amateur farmer. He planted vast beds, all over the place, of flowers of different varieties, with gravelled walks among them, and the flowers were hedged in by a sort of raised things which kept the flowers on one side and the walk on the other, and the visitor was warned at every angle not to go off the walk. A crowd of men were employed to keep the grass from growing in the gravel to interfere with the beautiful perspective which had been provided by the landscape gardener of that period.

After a while the Italian garden palled upon the senses in our climate.

It was only for about three months in the year that it was good for anything. During the rest of the year it was nothing but a gravelled walk. Then came the period of the grotto; and that still exists in some places. Then the amateur farmer employed various people to gather for him porous stone, limestone, stones that have, on account of their soft character, been acted upon by the waters and the weather, and that, when piled up, produce curious effects. He gathered those at various places upon his farm, and he trained the natural water courses to run through them, and produced grottos and waterfalls. No such thing was ever seen in nature, and no such thing ever ought to be seen in art.

I remember visiting a famous farmer, whose wealth was more conspicuous than his intelligence, who invited me to come up to his place. There was a large party of us, and he took us around a farm which was marvelous in these paved highways, these macadamized roads, these wonderful fences, these Italian gardens—of which he had a few left—these grottos and waterfalls; and finally he led us up by some gradations to the most wonderful of his grottos. It was a tremendous affair, about fifty feet high, of those piled up pumice and porous stones; and inside was apparently an exhaustless and limitles labyrinth. I turned around to our host and said "Is this a boarding house?" "Boarding house! Great God," said he, "this is a grotto." I was never again invited.

After the Italian garden period, and after the grotto period, came the period of colored leaf plants. Then every man took you up to his ancestral home—for I do not know of any farmer who does not farm on an ancestral farm. He had his fields laid out in leaf plants. There were red-leaf plants and green-leaf plants and blue-leaf plants and violet-leaf plants. All the colors of the rainbow were developed in leaf plants; and the gardener, whom he feared, and whose taste he did not dare question, had these leaf plants arranged so that the green was in the form of an anaconda, the same as you have it in nature; and the blue was in the form of an elephant, the same as you see in a menagerie; and the violet was in the form of the magnificent eagle; and there were cathedrals, such as usually grow on ordinary farms, and everything was just as natural as a man is accustomed to find on a well regulated farm anywhere in the United States,—anacondas and elephants and all that sort of thing, with cathedrals and all that sort of thing, just as they always are on ancestral farms,—all done up in leaf plants.

Somehow or other the leaf plant theory of landscape gardening did not work for a long time. It cost a great deal, it required a great many attendants, it led to a vast amount of criticism from critical people who really understood the thing, and who suggested to the owner, in a jocose way, various improvements upon the leaf plant investment, which led him to believe that, possibly, after all he did not understand the theory of landscape gardening as well as he might.

From those three processes the farmer has slowly graduated, until he has really begun to understand that landscape gardening, after all, is simply the cultivation of nature as it exists. Now, none of us is natural. If we were natural we would not be here. It is only because we are unnatural, because we have left the hayseed and clover blossom at home, because we have rubbed our faculties against the curbstone and sharpened them upon one another until, if we cannot make money out of each other, we can make it out of anybody else, that we are here to-night and able to pay for this dinner.

And therefore we finally arrive at this conclusion—that landscape gardening, after all, was the old farm as we remembered it as boys; the old farm where we rode bareback on the horses, and could stick, too; the old farm where we occasionally drove the oxen, and picked up stones in the fields; the old farm where we followed the mowers and the reapers and the harvesters, and loved to ride on the load as it came in from the fields, and loved to cock up the heaps as they were in the fields; the old farm as God had designed it and as nature had left it, the best exhibition of landscape gardening that had ever been seen. All the art and all the genius and all the fanciful devices of the so-called landscape gardener of the period had never improved upon what the Almighty had first created and our fathers had left to us.

And so all the world is dismissing the Italian garden, which is purely artificial—no such thing was ever seen in nature; is dismissing the grotto, which is purely another exhibition of the Barnum and Forepaugh shows, and indicates vulgarity of the worst sort; is dismissing the leaf-plant, which is an excresence, as much as it is to paint the monkey's tail sky-blue; and is coming down to the idea that the nearer you can get to good, honest lawn, to good, honest, real, natural forest trees, with just enough of taste to cultivate the one and to clip the other so that they harmonize in their general relations to your house and the purposes for which your place is intended—just to that extent have you got a system of landscape gardening which shows that you have sense and are worthy to own a farm.

I was, last summer, the guest of an old friend of mine of England, who owns one of the oldest places in the British Isles. It is a place where George III, as a boy, from the age of nine to thirteen, was under a tutor and played upon the lawn. It is a place mentioned in Evelyn's Diary and in Pepys' Diary, each of them saying that on that lawn Pepys and Evelyn played bowls. It is, by common consent, the finest piece of landscape gardening to be found in the British Isles. And yet there is not a day's work of the landscape gardener, so-called, upon the whole place. The lawn presents just that peculiar, wonderful, masterful, superb effect which mine host said only comes where you have at least two hundred years of a perfect lawn. It is not the blade of grass growing up, constantly clipped, with the slightest drouth growing yellow or brown. But by being kept clipped for two hundred years, the surface of the grass was precisely the same as the roots below, woven and interwoven, with web and woof, so finely and so closely blended, that it seemed like a carpet of green prepared by nature herself for those feet only to tread who understood what nature could do when she was at her best and had had two centuries of opportunity to develop a masterpiece. And as you passed beyond the lane, there were the beeches and the elms which had been there for three hundred, for four hundred, some of them for five hundred years, with old oaks of a thousand years, untouched since the Druid had celebrated his mysterious rites under their shade, relieved only by cutting out the underbrush, kept only by having pathways, through which you could walk, in endless, limitless variety, of that always varying color of green where nature never repeats herself but presents the green in a thousand shades.

And so this old lane and these old trees, these by-ways, these pathways, these secluded retreats, presented what the landscape gardener can never repeat, presented what obliterates the landscape gardener of our period—the only landscape gardener that God made, old Adam, and his descendants.

Mr. Rives—Gentlemen: I ought to mention that Mr. H. H. Hunnewell was invited to be here this evening, but the inclemency of the weather and the state of his health did not permit him to come. He would certainly have been a most welcome guest. He has invited the New York Farmers to visit him at his country place, which is so well known, in the vicinity of Boston, at a period of the year when his rhododendrons are in full bloom—the last of May or early in June—and hopes that all who are able to come will do him the favor, as he puts it, of visiting him. He has one of those beautiful Italian gardens which Mr. Depew has so strongly criticised. I suppose it is doubtless the best specimen of that kind of work which exists in the United States. I have discharged a pleasing duty in conveying to each of you his cordial invitation to be present.

A vote of thanks to the guests of the evening, who had entertained and instructed the Club, was moved and carried.

The thanks of the Club were also tendered to the President, Vice-President and Secretary, for their services during the past year, and to the Secretary *pro tem* of this meeting; after which the "The Farmers" adjourned to Thursday, December 11, 1890.

# Proceedings

of the

# New York Farmers

SEASON 1890—91.

---

PRINT
GLOBE STATIONERY AND PRINTING CO.,
89 Liberty Street,
New York.

# MEMBERS.

Mr. Daniel F. Appleton.
Mr. George F. Baker.
Mr. John S. Barnes.
Mr. Samuel Borrowe.
Mr. E. F. Bowditch.
Mr. Frederic Bronson.
Mr. George H. Brown.
Mr. James A. Burden.
Mr. LeGrand B. Cannon.
Prof. Charles F. Chandler.
Mr. Joseph H. Choate.
Mr. Smith Clift.
Mr. Samuel J. Colgate.
Mr. W. Bayard Cutting.
Mr. Alfred B. Darling.
Mr. Chauncey M. Depew.
Mr. Theodore A. Havemeyer.
Mr. Robert Hoe.
Mr. John I. Holly.
Mr. Adrian Iselin.
Mr. John Jay.
Mr. Charles Lanier.
Mr. James Lawrence.
Mr. Johnston Livingston.
Mr. Pierre Lorillard.
Mr. J. G. McCullough.
Mr. J. Pierpont Morgan.
Mr. Levi P. Morton.
Mr. Gilman S. Moulton.
Mr. James Otis.
Mr. George B. Post.
Mr. Percy R. Pyne.
Mr. Francis R. Rives.
Mr. Archibald Rogers.
Mr. F. Augustus Schermerhorn.
Mr. Samuel Sloan.
Mr. James Stillman.
Mr. Thomas Sturgis.
Mr. Rutherfurd Stuyvesant.
Mr. Walter L. Suydam.
Mr. Henry A. C. Taylor.
Mr. Jonathan Thorne.
Mr. Samuel Thorne.
Mr. Cornelius Vanderbilt.
Mr. William K. Vanderbilt.
Mr. Herbert Wadsworth.
Mr. W. Austin Wadsworth.
Mr. John Hobart Warren.
Mr. W. Seward Webb.
Mr. John D. Wing.

## COMMITTEE ON NOMINATIONS FOR MEMBERSHIP.

Mr. LeGrand B. Cannon.
Mr. John D. Wing.
Mr. Frederic Bronson.

# OFFICERS.

President, - - - Mr. FRANCIS R. RIVES.
Vice-President, - - Mr. JOHN JAY.
Sec'y and Treas., - - Mr. WALTER L. SUYDAM.

Address of Sec'y and Treas., No. 43 East 22d Street, or Blue Point, L. I.

~~a.1-2973~~

# The

# "New York Farmers"

HELD their first meeting of the season of 1890—91 at "Sherry's," on Thursday, December 11, 1890, Mr. LeGrand B. Cannon presiding. —In opening the proceedings, Mr. Appleton, who temporarily occupied the chair, said: Gentlemen—You have been delayed by the absence of the presiding officer. I had hoped that he would return before it became necessary to open the proceedings. Colonel Cannon has been unexpectedly called away to attend a meeting in another place near by, but he expected to return soon.

The subject for discussion this evening, as you have already been informed, is "The Reclamation of Waste Lands." It seems strange that it is estimated by the savants and experts on my right and on my left that one-half of the land in this country is still unreclaimed. I shall give way to Mr. Cannon [who had just returned] in a moment. It seems strange also that in the State in which my farm is located it is estimated that more than one-half of the land is still unreclaimed; and in the town in which my farm is located, and where I reside during some parts of the year, it is estimated, and I have concluded, from personal observation, that the estimate is correct, that three-fourths of the land in that town—and it is the second oldest town in this country—is still unreclaimed and might be called a wilderness of waste land. It is strange, I say, that we should be called upon to discuss this question as one of any present or pressing importance; and still it has a value, and of that matter, if Colonel Cannon were now in the chair—he happened to come in a moment or two too late —he could tell you much that is interesting; but it remains for me only, under the circumstances, to call upon the Hon. Edward Burnett to say what he has to say on that subject.

Mr. Edward Burnett: Mr. President, gentlemen and fellow Farmers—In opening the discussion of the subject of the Reclamation of Waste Lands, I will state that I come here from New England. You all know what a rough New England farm is. Twenty years ago I started in cutting about seventy-five tons of hay from such a farm; I am to-day cutting over two hundred tons. I have divided up my waste land into two distinct kinds, and will treat of the reclaiming of rough pasturage, upland, and the reclaiming of my meadow. The term meadow is used to designate the swamp land of New England. I have been most successful with my pasture land. After a good many years' experience I find that the best results are obtained by going back to the methods of the last generation, or the generation before that, and employing oxen. For a breaking-up team I use three yokes of oxen and a large No. 4 Centennial plow. If the Land is very rough we put about six or eight or ten men behind that team, with crowbars; and they will go across and clean up a large field about as fast as the oxen walk. In that way I can reclaim, at a cost of about fifty dollars an acre, rough pasture land.

The whole process is one simply of cleaning up the surface of the land to a depth of about eight inches, the depth of the plow. You must have a very strong, willing team, and the blasting and getting out of the larger stones must be done afterwards. First get off all your small surface stones. In some of my land I have taken as many as five hundred loads of stones off a single acre, which shows you the difficulties I have had to overcome.

A year ago this summer I was dining with Mr. Seers, who owns the farm that adjoins mine, and he said to me: "I have just offered a man $125 an acre to plow up the Fay pasture." I said "How many acres are there in the pasture?" He said "Eleven acres." I said "You have offered a big price." He said "I will give it to you." I said "All right; I will accept the offer and I will take hold of it within forty-eight hours."

I had to buy a complete outfit, including three yokes of oxen. The outfit cost three hundred and fifty-eight dollars. In thirty-two days I ploughed that eleven acres. I put in thirteen hundred inches of blast, which I paid for by the inch. The whole cost of reclaiming that eleven acres, ploughing it eight inches deep and putting under the surface every stone found on top of the land, was just $651. So that I made quite a handsome profit out of it. I sold my oxen, which I bought very well, and made a profit in the thirty two days—it took me that number of days to plow that land—of about $400 dollars. That was a very good sample of our rough New England pasture land; and to-day, gentlemen, I would like to have you see it. It certainly is one of the choicest spots on Mr. Seers' farm, and it is raising without any exaggeration, with not very heavy manuring, three tons of hay to the acre.

The reclaiming of meadow or swamp land is simply a question of dropping or lowering the water; and the only way to do that, in most cases, is by sub-draining—ordinary tile draining. I have had this year an experience in the draining of two hundred and fifty acres at the head of the Whippany meadows out at Madison, N. J. I have laid there one hundred thousand feet of tile, and have obtained very satisfactory results. The cost of that class of work varies a great deal. On the low meadow or swamp land the cost was reduced almost one-half.

The laying of tile is almost a subject in itself. We have in New England a great many very choice flat streaks of land, which simply need, for their reclamation, the straightening of an old New England brook. I have no doubt that many of you here who come from New England realize how the old brook wanders meandering down through the meadow; and if you take that brook and cut the crooks out of it and make it as straight as the crow flies you will find the depth of the water in the meadow reduced from eighteen inches to two feet, and will obtain, without any other work, most satisfactory results. I have reclaimed on my own place forty acres in that way. I think, with a gang of thirty Italians, I did it in about thirty days. We had exceptionally fine weather. I did it during a very dry season. I filled up all the bends of the brook in one of those old pastures, and in a few low places I dug ditches—broad, blind, wide ditches, four or five feet in depth—throwing the soil out, and making them some six or eight feet in width, filling in with stone. I used that same soil for covering the stones, and raised my land in spots, where necessary. At an expense of five hundred dollars I reclaimed twenty acres, that for a great many years have cut the heaviest and finest crop of hay I have cut on my farm. All I do is, about once in two or three or four years—it makes a difference as to the season—to go into that brook and cut out the swamp weeds and the pads, etc., that are apt to grow in a brook, and which change, perhaps, the current of the channel. And that land is to-day, as I say, about the best I have on my farm.

In the reclaiming on a large scale of meadow land by sub-draining and by tileage, I find there is a great difference of opinion among experts. Some claim that you should use nothing less than a two or three inch tile. My results have been more satisfactory where I used a small tile. My opinion, which is based upon an experience of perhaps only a few years, is that the smaller tiles flush more easily. They are easier to keep clean. It is better in the spring of the year, or in a very wet season, to have the small tiles full of water than it is to have a large tile only perhaps one-third or one-quarter full. In the laying of tiles through wet land be sure you get a good outlet. In the work I did at Madison this year it cost me $1,200 to make my outlet. I found one of those old New England brooks there. I lowered the water in that brook twenty-six inches. I cut it straight through the meadow, fifteen feet wide on top, and about six feet wide on the bottom, with a depth of from three and one-half to four and one-half feet. It was a tremendous undertaking, because I had to go through a wooded swamp; and you gentlemen all realize what it means if you have to tackle stumpage. It doubles the ordinary expense. With a gang of from one hundred to one hundred and fifty Italians I laid about a mile of tile a day. I had my clerk make up a little estimate of this work and the cost, and I find that we laid ninety-seven thousand six hundred and forty feet of tile. That includes the five mains, which run from twelve to eighteen hundred feet in length, and which mains are laid with four, five, six, and one of them, which was really a brook, with ten inch tile. Gentlemen, few of you realize, until you have tried the experiment, the immense amount of water that a six-inch tile will take. A common country brook, I can assure you, will flow through a six-inch tile. It is wonderful to see the body of water it takes. It is a very easy experiment to try, by simply damming up your stream and putting your tile in the dam, to see the quantity of water that will flow through a six-inch tile. The ten-inch tile that I put in carried quite a stream, and the overflow in the spring, I think, will fill it and flush it.

One of the first and most important things to decide upon is your grade. With some land it is almost impossible to get the proper fall. It is very risky work if you have less than four inches fall to the hundred feet. That makes a very slight fall. On one or two sections of this land I could only get two and a half inches fall, but I took the most exquisite pains with that work. All of that work was laid and graded by an expert that I got from Geneva, New York, which is probably the oldest tile section in this country; and that tile was laid as carefully as you would lay brick or stone in one of these great buildings that are going up here in New York City. If you can get a fall of from seven to eight or nine to ten inches in the hundred feet, so much the better; but you can do wonderfully good work with a four inch fall to the hundred feet. This ninety-seven thousand six hundred and forty feet, with five mains of from twelve to sixteen hundred feet in length, cost for digging, laying, back-filling and grading, $5,874.97, or about a dollar a rod. It was a very hard season. I began on the 15th of August on this work. You will remember, those of you who have been in New York or near New York during this past season, that we have had a great deal of wet weather; and on wet, swampy meadow, peat land, it adds a good deal to your expense if you are obliged to work in wet weather. The final result it will probably take two or three years to attain, but the results, even after only two or three months, are most satisfactory. Within ten days I have ridden on horseback all over that two hundred and fifty acres of land and have tried to find spots that I knew last summer, in June and July, were wet and swampy and impassable even for a man with rubber boots on.

The laying of the tile is one of the most particular parts of this work. It should be thoroughly well done, and done only by a man who understands it. We used there a very good tile that I got at Waubekan, N. J.; and my inch-and-half tile cost me $13 a thousand feet, delivered. It was moulded in two-foot lengths and was the round collar tile, which I have found, on the whole, much easier to lay and much more satisfactory than the horseshoe tile. One great trouble in buying tile is to get a tile that has a ring to it: and that, I think, is really the best if not the only test by which to determine it. It is a very simple one, and a boy of twelve years of age, with ordinary intelligence, can test all your tiles. Every tile that you lay should have a good ring to it. That was the stipulation in the contract that I made when buying this tile.

It was a most intricate piece of work on a part of this land, and I called in the services of a civil engineer. Usually I think that a civil engineer is in the way. I mean to the farmer. A man with common intelligence can stake out his main as well as his laterals. The laterals on very wet land should not be over thirty-five feet apart, and, if it is very wet and there is not much fall, thirty feet is still better.

The action of the water is rather curious. It descends to the drain in an arc; and for that reason, with laterals thirty feet apart, the tiles should be laid at least three feet or three feet and a half, which is still better, in depth. The greater the depth the more thorough your work; and, as I say, if a section of that land were presented to you here for examination you would find that the water described an arc between those two lateral drains thirty feet apart, and that it would be perhaps only twelve or fifteen inches below the surface at the centre. For that reason you see how important it is to get a depth of at least three feet to the tile.

We have had a great deal of trouble on this land. It was very springy and we were obliged to add a great many drains, aside from the laterals. We were obliged to tap various springs. At large springs I almost invarably left a manhole, so that, in case there should be any future trouble, the drains could be easily taken up and repaired or cleaned.

The whole system is very simple, and, as I say, the ordinary farmer can lay out his own tile drains and do it as well as an engineer. If you have a large piece of work, and you want a record of your work kept, then you may be obliged to employ an engineer and have a contour map taken, by which you can refer to your plant. Almost invariably, even on up-land, you can find the wet spot in your land. The tell-tale grasses crop up, and you see where, sometimes unexpectedly, you are obliged to lay drains.

I have given you these few short illustrations of the work. Fully realizing that you have other experts here to-night, and that the rule of the club is that a man shall only speak ten or fifteen minutes, I will close thanking you for your attention.

Mr. Post: I would like to ask you what mechanical means, if any, you took to prevent the filling of the pipe with silt?

Mr. Burnett: None at all. In doing work on a large scale like this, we simply filled in the drains with the natural soil that we had thrown out. If you are going to do a small piece of work, as I have done, for a rose garden, or something of that sort, and want to be perfectly sure of your work, there is no better way than the old Scotch method of laying your tile and then getting flat stones and laying them like an inverted V along the line of your drain, afterwards filling up with from twelve to eighteen inches of stones. That makes the most thorough work in the world; and if you reckon the cost on twenty-five miles of drainage you will see that it will require a member of this club to carry out the work.

Mr. Havemeyer: May I ask this question: What did you do with those stones on this land that you plowed up and left on the ground?

Mr. Burnett: Mr. Seers looked after that.

Mr. Havemeyer: That is not taken into account in this case.

Mr. Burnett: Oh, no. I would like to say something more about that piece of land. It was more than a rough New England pasture. It was covered with alders and with thorn bushes and with a most vigorous second growth, and I had not only to cut the brush away, but actually to put on stump-pullers and pull out a great many stumps; and a live stump is as difficult to get out as a back tooth.

Mr. Havemeyer: That expense was not included in this $50.00 an acre?

Mr. Burnett: Yes, that was included.

Mr. Havemeyer: What did you do with these tussocks on the meadows?

Mr. Burnett: I am glad to have you speak of that, as it had escaped my memory. I am glad to have you ask me questions. In speaking in this way, I generally say at the beginning that I shall be glad to be interrupted. The tussocks we have used to very great advantage in Madison, N. J., in filling up our drains.

Mr. Havemeyer: That is what I did.

Mr. Burnett; I had for three weeks a gang of about ten sturdy Italians, with axes and mattocks that were always sharp. We kept two grindstones on the field. Those men got to be quite expert in cutting off these tussocks, with which we filled our ditches. It was a wonderful help to us, because we had on this land a great many holes to fill; and there was a good deal of grading to do, which we are doing now. We are to-day carrying it on on a part of that very low land at Ipswich, and are raising the land by covering it with a layer of from four to six inches of gravel; and next spring we shall break it up.

Mr. Appleton: I would like to ask a question for information. I will preface my remarks by saying that I have reclaimed a great deal of waste land by drainage, and I have been very much gratified at hearing the statement made by Mr. Burnett, which I think is very accurate and very full, and will be useful to all of us. I would like to enquire what provisions are made against the filling of the tile by roots? I have one piece of land that has been drained twenty-one years, and near the outlet there is a six-inch tile. There is an elm tree that is twenty feet away; but every seventh year, the last of the series coming this year, we have found this six-inch tile to be completely packed full with roots not larger than sewing-thread. In another field, where the land is of a very different character, the tile being within two feet to eighteen inches of the soil, I find every year that the peculiar grasses growing over that tile will completely fill it with their roots. I find it necessary to provide against the filling of the tiles by the roots.

Mr. Burnett: You all realize, when I say I use a collar tile, that I use a tile that is very much better for that purpose than the Jackson or Albany tile.

Mr. Appleton: I use the same, procured from the same place.

Mr. Burnett They are simply put up butt against butt. Mr. Appleton brings up one of the most serious drawbacks to the whole system of drainage—the filling up of these drains by myraids of roots that are like fine hairs or threads. I have known them to strike out twenty-five to thirty feet. I took the bull by the horns and cut down the trees, when I began on this work. I said to Mr. Twombly, for whom I was doing this work, that there were just two things to be done about it: to make a park out of that land, or to reclaim the land for farming purposes. Much as I admire trees, I admit that it is impossible to do any tile draining through the woods. Mr. Appleton speaks about the grasses. Under favorable circumstances clover will throw its roots down four feet. Clover and strawberries are the most wonderful seekers after, not knowledge, but quality and richness.

Mr. Appleton: They are not perennial.

Mr. Burnett: No; but that is one of the great drawbacks in tile draining. It is a very easy thing to find just where your tiles fill, and I would like to ask Mr. Appleton if he has had any difficulty in finding just where to strike when the trouble begins?

Mr. Appleton: No; I can find out where the water comes out. If you walk over your main drain you can find it.

Mr. Cannon: I shall have to ask the charity of our guests and also the forgiveness of the Farmers for the brief absence I made this evening. Of course it is impossible for me to know what the substitutes have produced on this subject. My relation to the Farmers to-night is that of a substitute, and I confess that the mere mechanical part of the business I think I can fairly perform. The intellectual treats with which we have been entertained by our late admirable president, I am entirely incapable of. Being a horny-handed son of toil, about the best I could do for my family was to cultivate potatoes and onions and carrots. I have not had time to cultivate letters. But it seems to me that the subject we have before us this evening is one that is very comprehensive—the recovery of waste lands. It strikes me that it means rocks, swamps, sand deserts, and impoverished abandoned farms. I am quite satisfied that one great cause of the impoverishment of the land has been the disappearance of water, and that comes from the denuding of the forests. If we are to believe the Bible, and I doubt if there is anybody here who does not believe it, the most fertile part of old Syria was a land described as sparkling with fountains and one of the most fertile spots of the world. To-day, by the destruction of the forests, it is an irrecoverable desert. It is, therefore, in this day and in this generation, important to consider how we can preserve water. That can only be done, I believe, by the protection of our forests. We are favored, gentlemen, this evening by having present as a guest one who has made a topographic survey of a considerable portion of this State, especially of the North Woods and the Adirondacks; and I have no doubt that the result of his intelligent efforts in that quarter will be appreciated. I have the pleasure of introducing to you Mr. Verplanck Colvin.

Mr. Colvin spoke as follows: The "Reclamation of Waste Lands" has been the peculiar study of the American frontiersman-farmer from the foundation of our government. It was the first work of my English ancestors who landed on Plymouth Rock. It was the first work of my Dutch progenitors when they came to the hamlet of New York with its fifteen houses and a fort. It was the work also of my Scottish grandparents when they settled, before the revolution, near Coeymans in Albany county—and I, too, have seen something of frontier life and wild, if not waste, lands. There are many Americans who have made the development of wild lands the subject of scientific study. Washington, Jefferson, Jackson—time fails to enumerate and name the great and thoughtful men who have labored in this field. Of living men a host might be mentioned. That you have done me the honor to ask an address on this topic, is doubtless owing to my long study of the Adirondack wilderness region and the pending public question.

It is a question whether the phrase "waste lands" will apply to this magnificent forest. To reclaim its rocky cliffs and lofty mountains to the ordinary purposes of husbandry would be impossible. After all that can be said in favor of human genius, man's best efforts are exerted when he aids nature in cultivating what a thousand years have shown to be the favorite growth of the soil; and we look to those high mountains not for fruitful corn-fields but dark forests. From those slopes came the trees that, hewed by the stone axes of the natives, formed the log fortress of Champlain, and later these Adirondack hills looked down on our victorious navy in Plattsburgh bay in MacDonough's ever-memorable fight. From those same mountain slopes we now look for the victories of peace. To each farmer and householder throughout this State this is "the great wood-lot," of which he knows usually very little, for it is a vast forest, and few indeed are they that know its deep recesses. It is not all wilderness. It is not all forest. It is far from being all mountain, and we own only a small portion of what we once possessed. We have sold sections here and there. Where there were deep warm valleys, with intervales and fertile meadows, we have generally sold them or given them away—which is about the same thing. Some of these valleys are miles in width and many miles in length, pictures of beauty; the soil not black and unctuous or rich as southern fields, yet of earth and gravel, yielding good crops of those vegetables suitable to the climate—potatoes, oats, buckwheat, wheat and rye in lowland valleys, supporting a strong, muscular population of noble mountaineers.

Each year of the last quarter of a century has made wonderful changes in this country, and now the changes come on more rapidly than ever. Where weeks of journeying over trails and through pathless forests once brought us, now stage-coaches roll along over beautiful roads, while numerous railroads are rapidly making their way to the very heart of the region. Magnificent hotels, metropolitan in character, equipment and cuisine, are now found where only hunters' cabins were recently to be met with. The log cabins have in most places given way to villas and cottages, and the log-house will soon be a thing of the past. Cities, towns and villages grow with the rapidity of magic. The deer that fed upon the lily-pads at Raquette pond last spring found this fall a city of 800 inhabitants, with five hotels and mills, when he sought refuge in the lake from pursuing hounds, and got away because no one was on the runway with rifle at the street corner near the railway depot and hotel! You say the Adirondacks are ruined? No. They are not. They are too vast and too magnificent to be destroyed so easily. It is true that some of those charming spots that were day dreams of picturesque delight are now laid waste—but we must remember that we sold these lands, or permitted them to be sold, and we must not grudge the toiling owner his reward or the laborer his hire.

Besides, all is not lost. There are ten thousand nooks as beautiful as or more beautiful and picturesque than those which commerce has brought into the broad glare of day—for roads and railroads run upon the level lands, and will not traverse the remote gorges that the artists and the poet love; and remember that the ten counties of northern New York—the Adirondack counties—form an empire as great as the noble States of New Jersey and Massachusetts taken together. If area, intelligence, enterprise, perseverance, sobriety, and all the virtues give any rights, the Adirondack counties of New York would have what New Jersey and Massachusetts have—four United States senators· I hope these counties may have one United States senator, at least, allowed them in the near future. The reclamation of these nothern lands does not mean that they shall be handed back to babarism. Men will differ as to what it *should* mean. I can only give my own views as to what we should do with our great wood-lot. It is immense, this wood-lot of ours. Three million acres of tangled forest in the interior (that may be called wild land) occupy the centre of the district, and within this section we own between 750,000 and 1,000,000 acres of land, lake and forest. Why is it that at this time such a sudden development of energy has taken place in this northern country? Why has civilization suddenly turned this way and, marching forward upon its skirmish line, made these solitudes resound with the echoes of the strife of humanity? Is it not because the wild, western territories are at length filling to the brim with immigration, so that the human tide sets back from the desert valleys of the Rocky mountains and Sierras to the gorges of the Adirondack? If this be the hand of Providence, let us observe. Let us seek to discover the destiny of this region and aid it intelligently, lest, unhappily, we fight against God.

I favor the preservation of the Adirondack forest. I seek the creation of the Adirondack park—a project which I have urged in writing for more than twenty years, and by speech for a much longer period, and I am here to urge it to-night—but I trust the action that will be taken will be healthful, wise and just; truly preservative of the forest, but not in any way interfering with the natural trade and commerce of the country. When, in 1873, I was associated as commissioner, by the legislature of this State, with Gov. Seymour, Vice-President Wheeler, State Engineer Taylor, Franklin B. Hough and others, I was requested by the commission to call upon Gen. Dix, then Governor of the State, and urge him to recommend to the legislature, in his annual message, the great state park. I found Gen. Dix busied reading the proof-sheets of his message. He listened to my arguments and discussed the question of the state park earnestly, but I was surprised to find him at first somewhat opposed to it. "Has it occured to you, Mr. Colvin," he said, "how happily many families of the Swiss live, far up on the slopes of the Alps? How with a little pasturage and a cow or goats, with industry in some trade, they thrive beside the ice-cold streams of the glaciers? Remember that brave race. May not the Adirondacks be capable of supporting as brave and hardy a race, who shall be a bulwark to the State?" These questions were novel and startling to me. But I urged the importance of forest preservation, and Gov. Dix clipped the proof sheets of his message in two and inserted the recommendation I desired.

Now, I think that there was wisdom in the thought of Gen. Dix, as there generally is in every careful consideration by an honest, earnest man; and therefore I do not believe that one village or hamlet, or one habitation or cabin, owned by a private individual, who keeps the laws and respects his neighbors, need in this entire Adirondack region be changed or moved in order to grant us the great state park that we wish. There is no need to antagonize a single human being. It is not necessary to close a road or railroad, for without them we could not enter the country, and thousands of invalids would be deprived of the enjoyment of this healthful forest. The true course, it seems to me, would be to set aside for the purposes of the Adirondack park or state forest reservation all the untillable, rocky and mountainous lands upon the sources of the Hudson without touching one cleared farm or fertile valley. I should go even further, and give similar state guardianship to the forests upon the sources of the streams which flow to the St. Lawrence.

These are important steps not to be undertaken lightly—nay, not to be undertaken at all, unless accompanied by a definite and sufficient system of state forestry, well administered; for it would be better to allow affairs to rest in their present position, under private management, than to introduce an unguarded system of public plunder. It is indispensable that we institute in this State a good and reasonably perfect system of forest management. There is no question that the old method is obsolete and wasteful. If you appeal to lumbermen they will say: "We must hasten and get what we can from our lands or we shall be eaten up by taxes." The crying evil of these times is, indeed, scandalous taxation, by which the laborers, workers and land owners are robbed under color ot law. How are we to remedy this in the case of the forests and so-called waste land? Surely if the forests are of such great value they can be cared for out of the profits they will afford; the income should be sufficient to more than meet the expenses of the forest administration. This must be admitted,

Passing therefore to the question of the extent of lands to be acquired and the manner of acquisition, we find that in this region are the reservoirs which are the feeders and life of our canals. Under the constitution of this State the canals are given special safeguards. Article VII., section 6, of the Constitution says: "They shall remain the property of the State and under its management forever." The proper management of the canals entails the procurement of sufficient water supply for their use. This water supply can only be furnished by the Adirondack streams and lakes. Public purposes, therefore, require that the Adirondack streams, which are feeders of the canals, shall be protected and preserved. Lakes have shores; rivers have their banks; but the hidden springs and sources that feed the lakes and rivers have no shores nor banks—they are in the soil of the swamp, the depths of the sand bank, in the gravel beds, in deep mosses on the mountain sides, in the sponge of sphagnum and spruce-duff of the wilderness; the source of the river is in the clouds, but the hiding places of the springs is in the earth—in the wooden, spongy, dead sphagnum of the forest wilderness, and you must preserve and guard that wet, soaking soil in its normal condition of wetness if you are to preserve the springs that feed the Hudson most in the season of drouth.

These lands are needed for public purposes. The best and most lawful way in which they can be acquired is pointed out in the Constitution. Expert assessors appointed by the courts will give honest values for the lands, and the legislature of the State will not be burdened and annoyed with the task of valuing a multitude of tracts of land of which they know comparatively nothing, and about which they should not be lobbied with. The lands necessary can, therefore, be acquired lawfully and at comparatively small expense-

Assume the lands to have been acquired, what is the next step? How shall the forest be preserved? This would at first sight appear to be a simple question. "Leave the woods alone!" some might say. This would answer if we were content or the taxpayers were content with the expenditure of millions of dollars for a vast territory without expecting that the maintenance of the park should be by the income from the forests. Remember, I do not say interest charges on the expenditure—although good management of the forests might insure us that also—but the cost of maintenance of the Adirondack Park should be met or paid from the sales of surplus timber, aged trees that have reached maturity and which should not be allowed to go to waste. The maintenance, care and guardianship ought not to be expensive. Where hundreds of thousands of dollars are now reaped from these lands by lumbermen, the State, surely, ought to be able to obtain a pittance necessary for the care of the park from the mature trees.

When this shall be accomplished, and the State forests conserved by judicious action of good business men, acting in accordance with practical experience and the best principles of forestry, what shall be done with the private parks, club grounds and the like within the limits? The general principle would be; If these club lands were not on the divide, where the waters feed the canals, to make some arrangement for the purchase of such club property or for a contract by which the forest laws of the state and the principles of forest preservation shall be maintained on these private holdings; and, in return for compliance with the rules of restricted and careful, non-injurious timber cutting under state supervision, to allow these private conservators of forests some rebate of taxes proportional to the reduction in income, which adherence to the by-laws governing the park, might cause them. Such private holdings, however, should be made subordinate to public interests; yet tenderly and with care, that the individual be not crushed under the wheels of State. For those who have invaded the public domain, whether they be rich squatters or poor squatters, make the law alike for all. Do not tear down the hunter's cabin and leave the rich man's villa untouched on the State land.

Let the forest work be done by true foresters—by the woodsmen who were born and bred in the wilderness—giving them intelligent officers who will dwell in the forest as teachers of forest science to these woodsmen. After this all is a matter of detail. Yet some of these details are of importance, and one neglected principle ought to be made a chief rule of forestry —the protection of the streams from the heat of the sun and consequent evaporation. To do this, preserve the forest untouched along the banks of every stream for at least fifty feet back from the bank. This will afford shade to the streams and protection, by means of the interlaced and buttress-like roots, to the banks from torrental action of high water.

The planting of trees is hardly the subject of present discussion. This will do later on when the parks have been created. It is almost needless to remark that only the finest and choicest varieties of trees should in any event be planted—the pine and perhaps the spruce and wild cherry. Ordinarily tree growth is so spontaneous and rapid in the Adirondack region that some variety of "timber" is sure to grow even in the track of the forest fire, after the dense brush of raspberries, blackberries, pigeon cherries, etc., have passed away. Thick growths of aspen and birch usually follow rapidly, even on rocks which have only a trace of leafy mould upon it. The rapidity of tree growth, as I have observed it for the last few years, is marvelous, particularly that of the aspens, birches and pines.

We preserve the forest not only on its own account as a safeguard for future timber supply, but because the trees have such a powerful influence in protecting the moist earth from the sun's summer heat, as has been heretofore explained. This connects the reclamation of waste lands intimately with that of water supply. Indeed, the ownership of the forests includes the ownership of the lakes and ponds which, to the number of 1,000, sparkle and glisten among the Adirondack hills. The care and custody of these waters will naturally fall to the forest administration. Under whatever direction the control of the waters may be placed, the clearing and purification of the lumber reservoirs should be one of the first steps to be taken. This is not merely a matter of taste, but it is a question of public health. The mass of drowned timber in the old lumbermen's reservoirs, decaying and blackening the water of the lakes, is, in time of low water, most nauseating and miasmatic. It is fortunate that these beds of decaying vegetation are in the cold, elevated climate of the north, or malignant disease would punish not only the few inhabitants, but those who drink from these streams below. Let us clear out the dead and decaying timber from the shallows of such reservoirs as Indian Lake and Cranberry Lake; purify the artificial marshes by burning the drowned trees and rubbish, and then we shall have vast and good reservoirs, which shall be lakes of pure water. When the pure reservoirs shall have been made the water will be the finest in the world, and when the proper time shall arrive New York and all the cities of the Hudson will be connected by one aqueduct and together drink from the crystal springs of the Adirondacks.

It must not be forgotten, however, that the great public purpose proposed to be subserved by this reservation at the sources of the Hudson is the maintenance of the canals. Now the Hudson River between Castleton, Albany and Troy is little more than a grand canal of what should be a new world's Venice. This portion of the Hudson is practically as much a portion of the Erie Canal and the Champlain Canal as those artificial channels themselves. Let me say, as my deliberate opinion, that all of the work at the North, all of the preservation of the forests and lakes, will be for naught if this grand canal, the upper Hudson itself, be not properly cared for. How shall this be done? Make a grand canal of it. At the proper point above Athens, construct great locks in the river, locks capable of holding the largest ocean steamers. Control the channel and course of the river by cribs and jetties, and the work will be done. The system of dikes at present in use is good, as far as they go; but these dikes are practically inoperative during freshets, which are most powerful to injure or improve a river channel, and cribs and jetties to control the scouring action of freshets should reenforce the system of the dikes. These improvements, with the gigantic canal locks at the head of deep water navigation on the Hudson, would make the canal service as nearly perfect in system as could be, and with ship canals would give access for our smaller ironclads and torpedo boats, properly lightened, to the great lakes at the North in case of war, and thus protect our northern frontier.

And now let us turn from the consideration of the direct object of the great park to effects which are likely to come from this action. What will be the effect upon the great iron industries of the North? Will this action injure or impede those industries? I think not. There is no reason why the vast iron deposits of the Adirondacks should remain undeveloped. If iron be cheap, if steel rails, etc., are to be had at vastly less than their old price, then let us make more substantial bridges, heavier and more massive rails and metallic ties, so that the lives of passengers and the property of shippers shall be absolutely safe, under conditions of increased speed and better railway service. Thus shall the best service, the most and best traffic and profits be better divided among passengers, shippers and mine-owners, and all shall be well.

Similarly the development of the other valuable minerals of these mountains will not in any way interfere with the purposes of the great park. There is no reason why the garnet mines of the Adirondacks should be closed or interfered with. This industry is already of commercial importance, as for many purposes garnet serves as well as emery. Even should the sulphuret veins of the Adirondacks develop into ore beds as valuable as those of Colorado, the taking out of the ore, under proper restrictions, would not harm the park. So also with the nickel, silver, lead, etc., said to exist in certain places. What harm if valuable beds of these metals should be discovered and developed?

Of one ore, indeed, it may be that Adirondack mines will alone be able to furnish a supply. Rutile, the oxide or acid of the rare metal titanium, is found in many portions of our northern mountains. This is a rare metal, little used, and it is a sad source of perplexity to the iron-worker. If it gets into the blast furnace it turns the whole mass of metal to a hardly fusible steel-like product. Yet in the Catalan forge this titanium chilled iron can be wrought into tough steel of remarkable quality. This metal titanium is quoted in the curiosity list of rare metals at $2.25 per gramme. Compared with gold at $320 per pound this would be about $1,000 per pound for titanium. If titanium should prove in future to be a valuable ingredient in steel for armored ships this ore will be sought and reclaimed from its present neglected condition and the metal known as " Muchatt's steel " points to the utilization of such ores. So we see that there are valuable mineral deposits on these waste lands of ours, and that the working of such mines will in no way interfere with the preservation of the forest as a park, and no owner of mines should be made to feel anxiety or dread of any interference with his possessions. There is no occasion to antagonize a single mine owner.

Hunters will inquire: " What will be done with the wild game—the deer, bear, grouse and trout ?" This question is of more importance to the hotel and similar interests of Northern New York than the ordinary commercial topics heretofore discussed, for the wild game is the chief interest attracting lovers of field sports to the Adirondacks. As far as the existing game is concerned the laws are excellent, although admitting of some amendment. Deer are abundant for several reasons. First, the better enforcement of the game laws. Second, the narrowing in and clearing up of the border region, driving the deer back into the interior. Third, the cessation of market killing for meat and hides. Bears are reasonably plentiful. Unless attacked and wounded our Adirondack bear is rather well behaved and is such an addition to the chase that, within the limits of the park, I should favor the removal of the bounty, maintaining it, however, in those towns where sheep are raised beyond the borders of the State Park. It is true that the bear is frequently destructive to sheep and even to hogs, and, in seasons of scarcity, ventures into clearings in pursuit of food; but bruin shows a great deal of discretion, and as a native of the forest should hardly be branded as an outlaw. He is a foe, if you please, fit for honorable encounter, and one of the chiefest trophies of the chase.

The panther and wolf are destructive to deer ; but they are now exceedingly scarce, and regulate their behavior in these days so properly toward man that no hunter, I think, would care to have them become extinct. The ruffled grouse are found widely distributed, but are scarcer than heretofore. The spruce grouse is becoming exceedingly rare. In the fall wild geese, and ducks of limited variety, are met, while the gull and loon still make their nesting-grounds at the remoter lakes. The northern or varying hare, the red squirrel and chipmunk, are found widely distributed throughout the country ; and the porcupine, slowly carrying his armament of quills, feeds among the hemlocks and makes its dens among the rocks on the mountain sides. The beaver is very scarce, and the black cat, lynx, otter, sable and mink are less plentiful than formerly. Even the muskrat and aquatic birds have greatly diminished in number since the region has been more visited.

If we are to have a State Park the list of animal habitants should be enlarged. The moose and the caribou—now here extinct—should be brought back, for the young of these species can be easily had in Canada and Nova Scotia. We should not be satisfied with merely restoring these two mammals to our forest. We should bring from the Rocky mountains the big-horn or mountain sheep, the wild goat of the Sierra Madre, the cony and the ptarmigan, and from Sweden the beautiful black grouse, and all the varieties of game birds suitable to the semi-Alpine district of the Adirondack high peaks. There among the Arctic and Alpine flora these rare varieties of game would thrive and give an added interest to the more rugged and least fertile section, and an important addition to the larder of the hunter and traveler.

As for the trout the question of method of increase does not arise, but we are interested in increase of work. It is true that all of the Adirondack streams would be vastly benefited by an increase of trout-food, the planting or placing in the waters of the small crustaceans said to add so greatly to the flavor of the fish feeding upon them—a food sparsely distributed in Adirondack streams. It is said that the running of logs by lumbermen strips the rocks in the beds of the streams of the water-moss, which is the hiding place of these crustaceans. In such case the issue is between the lumberman and the fisherman, and they must settle it. One thing the lumbermen can do without much expense on small and shallow streams. They can, by constructing some of their ordinary piers and bulkheads, with side channels, cuts or canals, opposite the spawning beds of trout, protect the beds and preserve to the fish their ancient and chosen shallows. These old spawning beds represent the natural choice of the trout, and must be extremely favorable to the growth of the young fish.

There should be a State fish-hatchery at the source of every one of the chief streams or rivers; not expensive or extravagant concerns, but simple, well-constructed and sufficient works, left in charge of some reliable habitant, who, once instructed, would for a small stipend gladly each year attend to the hatchery and bring millions of trout to these streams. Fishways should also be provided at every mill-dam—guarded and secure—and no mill refuse should be permitted to fill in and choke the streams, killing or driving away the fish. The laws relating to lime, waste, etc., should be extended so as to cover all deleterious substances, refuse or sewage which poison the waters alike for fish or man.

Give the execution of this work to woodsmen, or those who love the woods and live in them; let good trails be made and the forest paths kept clear of fallen timber; let the woodsman guard and protect the game in the time of deep snows, making snow-shoe paths through or past the browse or green brush to and from the deer yards, so that the deer can reach their food and live. In a word, let things be well and wisely managed, and the waste lands of the North will be reclaimed in the interest of every class and of every person who, as a citizen of New York, is part owner of our grand domain. Then between the Schroon river and the Raquette, from the settlements of the Boreas to the Saranacs and the Whiteface mountain range, we shall have a magnificent semi-Alpine reservation; a forest as it was in the days when Columbus discovered America, with trees still growing which were there when Champlain first gazed upon these mountains when he first sailed upon the lake that bears his name. Around this central group of mountains the sources of other streams may be guarded by such larger areas of forest as may be necessary; in any event to be ample and sufficient for the great purpose in view.

Then will the forest be preserved without bringing destruction to the lumber industries of the State. Then will good highways, like the military roads of the Roman and French republics, open a pathway to the interior, not only for the sportsman and traveler, but for the health-seeker and invalid; and if we advertise our property by well-illustrated and truthful publications our waste lands will soon become the most valuable of our possessions. We shall reap from all portions of the world the income of travel and commerce, through and from this country, and shall possess for our own enjoyment and hand down to posterity this magnificent heritage of forest, lakes and mountains, which for combination of grandeur, beauty and accessibility is unsurpassed elsewhere in the world.

Mr. Cannon: Gentlemen, after the very comprehensive and intellgent paper which has just been read by Mr. Colvin, it is evident that the matter of waste lands at the present day and their recovery is being substantially comprehended in the preservation of the North Woods, and perhaps independent of politics, commerce and finance, there is nothing more properly engaging the attention of the people of this State than the great Adirondack Park. The importance of dedicating this vast territory as a great State Park has been very favorably and intelligently presented to us in this paper, by Mr. Colvin, who has also pictured to us a park thoroughly equipped not only with the game which naturally belongs there, but by the introduction of other game which that country is capable of sustaining. It seems to me, however, that he rather anticipates the question. The first great point to be determined by the people of this State is the acquisition of the Park. If we are to judge by the expressions of the press of the State there seems to be no diversity of opinion at all that the State should make any necessary expenditure to dedicate that great territory for public use. The Legislature has not hesitated to grant that power to municipalities, as in the City of New York, to the extent of millions of dollars, for a local park which can only be enjoyed, to any great extent, by the immediate residents. The acquisition by this State of this great domain will be for the benefit of the entire country. We not only want that acquisition to preserve our water supply, but far more than that; by the preservation of our forests we perpetuate for all time that region as a great sanitarium; and, beyond that, as a matter of pleasure, we preserve our game. We are fortunate in having with us this evening a gentleman who is at the head of the Forestry Commission of the State, who we all know has devoted a great deal of time and intelligent thought to bringing before the Legislature of this State a scheme by which this great property can be acquired, preserved and dedicated for all time to these purposes. I have, gentlemen, the honor of presenting to you Mr. Sherman J. Knevals, President of the Forestry Commission of this State.

Mr. Knevals: When I look around on this company and consider what manner of men you are who pursue farming it seems to me that the poet had you in mind when he said, in the Hunting of the Snark:

"They pursued it with forks and hope,
They threatened its life with a Railway Share,
They charmed it with smiles and soap."

—for certainly the principal requisites and factors in gentleman farming are plenty of hope and plenty of soap—although our poet was a little lame, as your chairman well knows, in suggesting that the possession of railway shares interferes with sound farming.

I don't understand at all why I am called upon to talk unless it be that a weak and foolish idea has entered the mind of the chairman that I being a Forest Commissioner am, or ought to be, able to make a little bit of a "stump" speech. I will be very brief, and as I once heard an old country temperance lecturer say in opening his address, I will confine myself to two *pints*. It is unnecessary in this place, especially after the able paper of Mr. Colvin's, to repeat the hackneyed and familiar arguments in favor of the preservation of the forests, nor even to urge the creation of a State Park in the Adirondacks which shall furnish a play-ground for the people; a sanitarium for the healing of the nation; and, as I verily believe, eventually a constant revenue to the treasury of the State. On this point we all agree and we are all, I trust, enthusiastic.

I would rather call your attention to the great danger which exists, that through the inattention and indifference of some of the friends of the park and the lack of harmonious action on the part of others, the whole scheme will fail. Enemies open and concealed are bad enough, but if some friends are lukewarm and others so wedded to their pet ideas that they will yield nothing, the project is indeed in peril. I earnestly hope that the friends of the park, and I certainly reckon you among them, will unite to render all the help in their power in perfecting and passing at the coming session of the Legislature a bill which will accomplish the object in view, although it may not express or reflect all the notions, if any.

It is only by an unselfish devotion to the main idea that we can hope to succeed. The time is most propitious, a favorable public opinion is aroused, and failure this winter would indeed be a disaster. My second thought is rather a suggestion, and with that I will close. It relates to tree planting. In that finest of novels and most delightful of books—"The Heart of Mid-Lothian"—Scott represents the old Laird of Dumbiedikes on his death bed giving his last advice and counsel to his son and heir, on the management of his estate.

"Jock," he said, "when ye hae naething else to do, ye may be aye sticking in a tree: it will be growing, Jock, when ye're sleeping."

This matter of tree planting in the Adirondacks, which seems now so chimerical, and so much like "carrying coals to Newcastle," will, in my opinion, be a practical subject of great importance in a few years; and who knows but what it may be a function of this club of New York Farmers to promote the artificial growth of forests and in that way to recover and restore the waste lands?

Mr. Cannon: It may be something of a departure for a few moments to give up the consideration of waste lands and to consider that of extreme fertility. There are some sections of this country so blessed by soil, by climate and by growth as to be almost entirely independent of the efforts and labors of man. I may say that, as an illustration of that condition, all who have visited the blue grass region of Kentucky are entirely satisfied that that is the elysium of the earth. We are favored this evening by having one of her most distinguished sons with us, a man who illustrates in himself what the blue grass region can do, underlayed with a certain amount of lime, for that, I believe, is absolutely essential to the highest development of the animal as well as the vegetable kingdom. It is with extreme pleasure, therefore, that I have the honor of presenting to you this evening my friend, General Bristow.

Mr. Bristow: Mr. Chairman and Farmers of New York: Is this quite fair? I had no thought of being called on to say anything about blue grass, because that is a subject which a Kentuckian dare not trust himself to talk about to people who are not familiar with it, lest he be charged with exaggeration. I must say, however, that much that has been said this evening is a revelation to me. I remember to have seen the statement made some years ago by a gentleman who made some pretensions to statistical knowledge and who has certainly been prominent before the public, that the stone fences of New England represent, in actual cost and labor, more than the whole land is worth in dollars and cents. However that may be, to some extent, an exaggeration, it nevertheless presents the contrast between that region of country and the region to which my friend has so delightfully referred. In the blue grass region there is no occasion to indulge in these expensive fences and ditches and subterranean drainage and all that sort of thing to make arable land. The Almighty has done all that for us, and all that is necessary now is simply to expend a reasonable amount of labor in order to secure a sufficient and satisfactory and profitable return. I am sure I need not remind gentlemen at this table that we have not indulged a selfish pride on account of this natural advantage over our neighbors. It is within the memory of every gentleman around this table—certainly it is within the reading of all, if not within their personal recollection—that the man whom we most delighted to honor as the central figure of our blue grass region, left his home at Ashland and came to Washington, the political capital of the nation, to advocate systems which certainly have not been offensive to my friend, the chairman, and to other gentlemen around this table. He was known to the country and to the world at large as the advocate of the American system, not only for the protection of New England but for the protection of the entire country, and all the industries and every department of the industries of the country.

I have been much interested in what has been said here this evening about the preservation of the Adirondack woods, waters, scenery and game. This is important to the people of New York State and to those of other States who resort to that picturesque region for health or pleasure.

I beg to remind the farmers of Fifth Avenue that the preservation of the forests and streams and game of the National Yellowstone Park is a matter worthy their attention and active interest. The already developed wealth and the untold possibilities of a vast domain of country depend largely upon the supply of water for irrigation, and this can be maintained and further developed only by preservation of the immense forests upon the mountains, where the little streams are formed. They will not "go on forever" nor even for a considerable part of each year if the forests shall be destroyed. The preservation of the forest of the Yellowstone Park will perpetuate the wild beauty of that wonderful region, increase the supply of large game, preserve the game fish in its streams and add immensely to the area of farming land.

As practical farmers and frequent diners you are interested in these things. I beseech you not to neglect them.

Mr. Post: I move that the thanks of the society be extended to the gentlemen who have spoken to-night upon the subjects under discussion, and to Mr. Colvin for the very admirable paper he has read.

The motion was seconded and carried unanimously.

After discussion it was decided that the subject for the next meeting should be "The Feeding of Cattle," and that no experts should be invited, the speaking to be confined to members only, after which "The Farmer's" adjourned.

# The “New York Farmers”

HELD their second meeting of the season at the Hotel Brunswick on Thursday, January 8, 1891, Mr. LeGrand B. Cannon presiding in the absence of President, Mr. Rives.

Mr. Cannon, in opening the proceedings, said: Gentlemen—I believe at the last meeting that, in making provision for a presiding officer for this dinner you again visited upon me that obligation. There was another suggestion which occurred to all of us at that dinner; that we had considered about all the subjects in the economies of agriculture, and that our only resource was to return and review them. We were aided in arriving at that conclusion by one of the most astute of our farmers, Mr. Havemeyer, who suggested that we should return to a discussion of food for cattle. Our Farmers have not forgotten that, perhaps, one of the most profitable, as well as one of the most amusing and suggestive discussions we ever enjoyed, was upon that subject. The fertility of the American mind is so great as to appear to have no limit, and the experiences of one year seem to have but little significance with reference to the results of the next.

None of us can forget the remarks of Farmer Choate, one of the most shrewd and economic of our members—a man who has, perhaps, never been surpassed in his careful research and economy except by that distinguished Alderman of London, Alderman Meché, who, in determining the possibilities of the soil, produced in a single year one hundred tons of rye grass, at an expense of about £50 a ton. Farmer Choate, I may say, indulged on that occasion in a most unwarrantable liberty. Learning the subject was to be discussed, he quietly solicited from several of our Farmers a statement of their experiences in feeding, and on that evening, after listening to the scientific addresses, and learning all about the albuminoids and nitrates and all the other *oids* and *ates*, he, in the most ruthless manner, exposed the secrets by which his brother farmers had attained their successes.

It will be remembered on that occasion that the first confidence Mr. Choate exposed was one from our friend Mr. Havemeyer; and it will be remembered that, after having had all these scientific formulas tried, Mr. Havemeyer determined that the only thing that could possibly sustain a Jersey herd in high condition was the entire production of a great sugar establishment. I have no doubt that since that date there have been very considerable advances made, and that to-day it would be found to require a combination of all the sugar refineries of the country. I, therefore, call upon Mr. Havemeyer to give us his experience in the economies of feeding.

Mr. Havemeyer: Mr. Chairman and Gentlemen—My memory not being quite so good, probably, as that of some of the younger members of the Farmers, I shall have to jog it from time to time by reference to the papers before me, containing, as they do, a mass of figures.

The principal reason why I suggested to the Farmers, at their last meeting, that the subject of the feeding of dairy cattle should be discussed this evening was that I thought such a discussion, if confined, perhaps, to the members, might bring out some facts of importance, and having these facts for purposes of comparison, the results might be, in the end, beneficial to one and all.

The experience of my life has led me to know the value of comparisons. Having been interested in different firms doing business in different sections of the country, and having had before me the results of the various branches of this business, it was very easy to see where one ran behind or ahead of another, and by striving to bring all up to the best standard, the results proved satisfactory, leading to great economies and benefit by acquiring the knowledge and experience of many instead of one.

I have met men having the management of only one establishment who have believed that it was conducted on the most scientific and economical plan, and have always considered their own baby the best. A comparison of their work with my own has led them as well as myself to believe that they were very much mistaken. I believe one of the great benefits of combination results from the knowledge which can be acquired by comparison. If each gentleman farmer at this table were to examine, and come here prepared to give, the results obtained by his system of feeding cattle, I have no doubt that the comparison of these results would be of great benefit to the individual farmer by bringing up the poorer to the standard of the better.

What is true of the farm is also true of every other branch of industry. If the gentlemen who control railroads could have the benefit of comparison and could know exactly what the other railroads pay for cost of transportation, coal, expense of repair and all the various items which go to make up the general expense account, I am pretty certain that in some, at least, great economies could be accomplished. I believe that if the New York Farmers desire to conduct their farms, dairy or breeding establishments upon the most economical basis, it will be very advisable and useful for them to get the benefit of the experience of others and compare the results with those obtained by their neighbors.

This in explanation of my reasons for bringing forward this subject tonight.

I do not intend to convey, in anything that I shall say here, the thought that the method of keeping, treating and feeding cattle at Mountain Side Farm is better than any other method. What I propose to do is to give you facts and their results. I will lay before you the facts of a few comparisons we have made between our method of feeding and what has been suggested and done by others, leaving you to judge whether we accomplish more or less than others.

We have had experts before us and they have given us their views on the subject to be talked about this evening. I have found that these experts, with few exceptions, had already published their conclusions or had absorbed their information from sources available to all of us. I have here, for instance, the report of the New York Agricultural Experiment Station on cattle foods and feed rations, which probably gives as accurate information as would be given by the writer himself were he here. It tells the farmers how to feed; gives the proper ratio for a ration, and gives a number of feeding rations for cattle that have been sent to the station by farmers from various sections, with added information by Prof. Collier. My attention has been particularly called to this pamphlet and the information it contains by a statement that was made in the lecture of Prof. Collier on the Future of American Agriculture. He states that agriculture is to be the great future success of this country, that the population of the country is constantly increasing and that the consumers of agricultural products are increasing more rapidly than are the producers, and, consequently, the farmers must be benefited. Amongst other things he says: "Let me indicate the possibilities—yes, the probabilities—which lie in this direction for the intelligent farmer. Two of our leading New York dairymen secure practically the same average product in butter from their herds, and their results are nearly three times the average results secured in this State, but one of them feeds a ration costing fourteen cents daily per cow, and the other, getting no better result, feeds his cows a ration costing exactly double, twenty-eight cents per day. But one cent a day saved on the dairy cows of this State means a saving of over $16,000 a day, a saving of nearly $6,000,000 a year on our cows alone. This is one of the practical problems upon which your experiment station is engaged."

After reading this article I wrote to Prof. Collier and asked him if he would give me the ration which cost fourteen cents a day as well as the one costing twenty-eight cents a day. He replied referring me to page 156 of Bulletin No. 17, which reads as follows:

No. 11, Holland Patent, N. Y.

The herd consists of eleven Jerseys and grade Jerseys. Cows go dry about three weeks and come in milk at all seasons. Average annual milk yield, about 5,000 lbs. Average butter per cow, annually, 300 lbs.

The following was the ration fed at date of report:

| | | |
|---|---|---|
| Meadow hay | 3 | pounds |
| Corn ensilage | 40 | " |
| Wheat bran | 4 | " |
| Cotton seed meal | 2 | " |

The above ration calculated for digestible matter is as follows:

| | | |
|---|---|---|
| Albuminoids | 1.52 | pounds |
| Carbohydrates | 6.59 | " |
| Fat | .71 | " |
| Nutritive ratio | 1:4.5 | " |

According to German standards, this ration would be considered perfectly balanced as regards the relation of albuminoids to carbohydrates. The interesting feature is the small amount of dry matter consumed per day by the animals. When we consider the returns given by the cows, an average annual butter product of 300 lbs., it is evident the food is well digested and assimilated by the animals.

A farmer who naturally seeks a food ration, especially if that food ration is stated to be perfectly balanced, and who knows that the ration he is at present feeding exceeds the cost of the ration given, would naturally make the test. Being a farmer, this is what I did. The following is the result:

I took Zena 2d, a thoroughbred excellent cow, six years old, fed her ten days and tested her the last seven.

[I might here state that the cost of the foods used in all the tests which I shall submit have been calculated in each case at the same value.]

The feed ration and cost was as follows:

| | | | | |
|---|---|---|---|---|
| 3 | pounds | Hay at $\frac{9}{10}$ cent per pound................ | 2$\frac{7}{10}$ | cents |
| 40 | " | Ensilage at $\frac{1}{20}$ cent per pound............ | 2 | " |
| 4 | " | Bran at 1 cent per pound.................. | 4 | " |
| 2 | " | Cotton seed meal at 1$\frac{1}{5}$ cents per pound..... | 2$\frac{2}{5}$ | " |
| | | Total cost of ration................................ | 11$\frac{1}{10}$ | " |

The cost of this ration, therefore, is 11$\frac{1}{10}$ cents per day, instead of 14 cents, as given.

But to this must be added:

| | |
|---|---|
| 5 pounds of straw for bedding at $\frac{6}{10}$ cent per pound.. | 3 cents |
| Labor per day per cow.............................. | 5 " |
| Making a total of.................................. | 19$\frac{1}{10}$ |

The results obtained by this ration were as follows:

| | |
|---|---|
| Milk, 7 days, 103 pounds 3 ounces | Butter made, 3 pounds 10 ounces. |
| Per day, 14$\frac{3}{4}$ pounds | per day 8$\frac{1}{3}$ ounces. |

Quantity of milk required for pound of butter, 30 pounds.

I will later submit to you figures that will show that to produce a pound of milk costs, at Mountain Side Farm, 3$\frac{17}{100}$ cents, everything included.

As the subject to be talked about is not only the feeding of cattle but the cost and value of the products in relation thereto, and as I had to take some figure in order to make the calculation, I concluded to take the actual cost, as shown by the books at Mountain Side.

| | |
|---|---|
| The daily value of the milk obtained from Zena 2d was.. | 46$\frac{76}{100}$ cents. |
| Deduct cost of feed, &c........................ | 19$\frac{10}{100}$ " |
| And the balance in its favor was...................... | 27$\frac{66}{100}$ " |

Selling the milk at 6$\frac{1}{2}$c. per qt. gives a profit, then, of 27$\frac{66}{100}$c. or say about 27$\frac{1}{2}$c. per day.

Now comes in a very important element. The cow fed on this ration lost in ten days 90 lbs. of flesh, or say 9 lbs. per day. If we assume the value of the flesh to be 4c. per pound, a loss was made of 36c., or a loss per day of about $8\frac{1}{2}$c., instead of a profit. The Bulletin says: "When we consider the return given by the cows, an average butter product of 300 pounds, it is evident that the food is well digested and assimilated by the animals."

Now we will put this milk into butter:

| | |
|---|---|
| Butter made, 7 days | 3 lbs. 10 oz. |
| Or, per day | $8\frac{1}{3}$ oz. |
| Assuming the value of butter to be $47\frac{55}{100}$c.... the value of the butter made was, say | 24 cents. |
| Cost of ration | $19\frac{10}{100}$ " |
| Balance | $4\frac{90}{100}$ " |
| Loss of flesh | 36 |
| Loss | $31\frac{10}{100}$ " |

Before comparing the results of the Mountain Side ration with that above given, it will be well to state the present cost (which is very high) of the various foods:

| | |
|---|---|
| Corn meal, 56c. per bushel of 56 lbs | 1 cent. |
| Bran, $20 per ton | 1 |
| Ground oats, 48c. per bushel of 32 lbs | $1\frac{1}{2}$ |
| Oil meal, $24 per ton | $1\frac{1}{5}$ |
| Cottonseed meal, $24 per ton | $1\frac{1}{5}$ |
| Ensilage, $1 per ton (actual cost 98c.) | $\frac{1}{20}$ |
| Hay, $18 per ton | $\frac{9}{10}$ |
| Straw (oat), $12 per ton | $\frac{6}{10}$ |

The Mountain Side herd on December 31 consisted of:

200 milking cows.
9 bulls in service.
97 heifers, all ages.
4 bulls, all ages.

310 head.

We were milking on December 31st of the 200 cows 117, and had eighty-three dry cows, or a proportion of about forty per cent. The cows we were milking averaged $16\frac{3}{4}$ pounds of milk per day. The total of milk from the 117 cows was 1,959 pounds.

I will now give you the data from which we have obtained the cost of keeping the herd.

The winter ration for milking cows consists of:

| | |
|---|---|
| 8 lbs. corn meal at 1c | 8 cents. |
| 2 lbs. bran at 1c | 2 |
| 4 lbs. ground oats at $1\frac{1}{2}$c | 6 |
| 2 lbs. oil meal (linseed) at $1\frac{1}{4}$c | $2\frac{2}{5}$ |
| 25 lbs. ensilage at $1\frac{1}{20}$ | $1\frac{1}{4}$ |
| 7 lbs. hay at $\frac{9}{10}$ | $6\frac{3}{10}$ |
| Total cost | $25\frac{19}{20}$ |

(say 26c.) per head for milking cows. This is fed in three meals, morning, noon and night; hay generally at noon and the ensilage in the morning and evening.

The summer ration for milking cows is:

| | |
|---|---|
| 4 lbs. corn meal at 1c | 4 cents. |
| 2 lbs. bran at 1c | 2 |
| 6 lbs. ground oats at $1\frac{1}{2}$c | 9 |
| 2 lbs. oil meal at $1\frac{1}{5}$c | $2\frac{2}{5}$ |
| 30 lbs. ensilage at $1\frac{1}{20}$ | $1\frac{1}{2}$ |
| | $18\frac{9}{10}$ |

(say 19c.) per day per head as summer ration for milking cows.

Cost of ration per head of milking cows for the year, fed for nine months or 270 days winter ration, and three months or ninety-five days summer ration:

| | Days. | | Cost. | | | Average cost per day for the year. |
|---|---|---|---|---|---|---|
| Winter ration | 270 | x | 26c. | = | $70.20 | |
| Summer ration | 95 | x | 19 | = | 18.05 | |
| | | | | | $85.25 ÷ 365 | = $24\frac{18}{100}$c. |

The result, $24\frac{18}{100}$ cents, is the average cost per day for the year of the milking cows only, which constitute about sixty per cent. of the herd.

Mountain Side winter ration for dry cows and bulls consists of:

| | |
|---|---|
| 6 lbs. ground oats at $1\frac{1}{2}$c | 9 cents. |
| 2 lbs. bran at 1c | 2 |
| 7 lbs. hay at $\frac{9}{10}$c | $6\frac{3}{10}$ |
| 20 lbs. ensilage at $\frac{1}{20}$ | 1 |
| Cost | $18\frac{3}{10}$ |

In summer they are turned out for three months, and I have not included the cost of pasture in this calculation.

The winter ration for heifers is:

| | |
|---|---|
| 4 lbs. ground oats at $1\frac{1}{2}$c | 6 cents. |
| 2 lbs. bran at 1c | 2 |
| 10 lbs. ensilage at $\frac{1}{20}$c | $\frac{1}{2}$ |
| 5 lbs. hay at $\frac{9}{10}$c | $4\frac{5}{10}$ |
| Cost | 13 |

Bulls in service same as dry cows.

Cost of ration per head of dry cows for the year, feeding nine months or 270 days on winter ration, three months or ninety-five days at pasture. Ration, 19c. per day:

Days. Cost.

270 x 19 = \$51.30 ÷ 365 = 14c. average cost per day.

Cost of keeping milking herd per day and results therefrom:

| | Average Cost per Day. | |
|---|---|---|
| Milking cows | 117 x $24\frac{18}{100}$c. | = \$28.29 |
| Dry cows | 83 x 14c. | = 11.62 |
| Bulls in service | 9 x 19c. | = 1.71 |
| Straw for bedding, 5 lbs. per head at $\frac{6}{10}$c. per lb., or \$12 per ton, 3c. per day per head, 209 head x 3c. = | | 6.27 |
| Labor $5\frac{1}{25}$c. per day per head, 209 x $5\frac{1}{25}$c. = | | 10.53 |
| Average cost per day feed, straw and labor for 117 milking cows, 83 dry cows, 9 bulls in service | | \$58.42 |

say 28c. per head per day.

The average milk produced per head per day during the year 1890 was $16\frac{3}{4}$ lbs.

Average number of cows milking per day 110 x $16\frac{3}{4}$ = 1,842 lbs. per day. To pay expenses there should be received $3\frac{17}{100}$ cents per lb. or (as 2 lbs. 2 oz. make a quart of milk) $6\frac{74}{100}$ cents per quart.

Mr. Cannon. Is that $16\frac{3}{4}$ lbs. the average of the entire herd, both dry and milking cows?

Mr. Havemeyer: No, only of the milking cows.

Mr. Cannon: I thought, to get at the average, you included the entire herd.

Mr. Havemeyer: If the entire herd were included the average would be about 11 lbs.

I will now turn the milk into butter. The average quantity of milk required to make a pound of butter is 15 pounds The expense of producing the milk is $3\frac{17}{100}$ cents per pound. 15 x $3\frac{17}{100}$ = $47\frac{55}{100}$ cents per pound of butter.

The average quantity of milk per quart of cream is 15 pounds. For cream, consequently, you must get $47\frac{55}{100}$ cents per quart. The milking cows averaged per day $16\frac{3}{4}$ pounds of milk. The cost of labor attending the care of 310 head equals $5\frac{1}{25}$ cents per day per head.

I have already given you the result of Zena 2d's test of the feed ration given in the Bulletin under the heading "No. 11, Holland patent" p. 156. It showed a loss, if you calculate the loss in flesh at 4 cents per pound, of $8\frac{44}{100}$ cents per head per day on the milk if the milk is sold or, if the milk is turned into butter, of 31 cents.

The same animal, Zena 2d, was fed 7 days on the Mountain Side ration.

| | |
|---|---|
| Cost of ration, [winter feed] | .26 cents |
| Straw | .03 " |
| Labor | .05 " |
| | .34 " |

Results; Holland patent ration.

Milk, 7 days........134 lbs., 2 oz.
" per day....... 19 " $2\frac{1}{2}$ oz. 1——as against $14\frac{3}{4}$ pounds
Butter made........ 9 " 8 oz.
" per day....... $1\frac{41}{100}$ lbs. " " $\frac{1}{2}$ "
[Quantity of milk required
for pound of butter........$14\frac{1}{10}$ " ] " " 30 "

Assume the value of the milk to be $3\frac{17}{100}$ cents
per pound, the daily return from milk was............... $60\frac{63}{100}$ cents
Deduct cost of feed, etc......................... 34 "

Balance in favor of Mountain Side ration........... $26\frac{63}{100}$ "

The cow gained in weight.

Butter made in seven days from this milk 9 lbs. 8 oz., or per day $1\frac{41}{100}$ lbs.

Assuming value of butter to be $47\frac{55}{100}$c. per lb...... $67\frac{4}{100}$ cents.
Ration, labor, &c.................................. 34

$33\frac{4}{100}$ cents.

Mountain Side profit if *milk* is sold..... $26\frac{63}{100}$ cents.
Holland Patent ration, gain, if *milk* is sold......... $27\frac{56}{100}$ cents.
But loss in flesh.................................. 36

Holland Patent, net loss per day per cow.......... $8\frac{44}{100}$ cents.

Mountain Side profit if *butter* is sold..... $33\frac{4}{100}$ cents.
Holland Patent ration, gain, if *butter* is sold........ $4\frac{90}{100}$ cents.
But loss of flesh.................................. 36

Holland Patent, net loss per day per cow.......... $31\frac{10}{100}$ cents.

I wish to say here again that I do not dispute the results as given by others. All I can say is that I have been particular in making tests, keeping strict account of the milk obtained, and have given the facts as far as Mountain Side is concerned. I must leave you to judge as to the value of the different rations.

I suppose it has been the experience of all of us to have heard from others what they do; how they feed and what are the results they obtain. I doubt, however, if many of us here assembled take the trouble to investigate for themselves as to whether the statements made are reliable and are the actual results of experiment carefully watched, or merely based upon the statements of employees. For instance, breeders have told me that a good feed was corn fodder, or corn stover, or, again, mixed ensilage and corn stover. Now, I know of no better way to ascertain the facts than to make the tests oneself. Therefore I have made it a point, when I have been told that a certain ration has accomplished a certain result, to make a trial of that ration. I acknowledge that to make these tests or trials costs considerable in trouble and bother, but I think the bother and trouble may receive its recompense. I would say, right here, that if any gentleman present would like me to test his ration I will instruct my manager to do so and give him the result, my object being to secure a ration that will give me the best results with the least expense.

Mr. Moulton, amongst others, has been kind enough to give me the ration adopted for the Green Mountain farm. I tested this ration at Mountain Side, using the cow "Doe Magna," a thoroughbred animal of splendid quality, twelve years old. Test was of seven days' duration.

Mr. Moulton claimed that the mixture of ensilage and dry fodder used alone, or steamed and mixed with corn and then fed with ensilage to the cow, possessed great advantages. Having raised more corn than I could put into my pit as ensilage, I had about 400 tons of excellent dry fodder over, this year, and I told Mr. Meyer to make a series of tests on the Moulton principle, which he has completed.

You will notice that the cost of the Moulton ration, being 18$\frac{1}{10}$c., or, with the straw and labor added 26$\frac{8}{10}$c., is cheaper by 8c. than the Mountain Side ration, which costs 34c. That is considerable.

The result of the test of the Moulton ration was as follows:

Ration.

| | |
|---|---|
| 4 lbs. corn meal at 1c | 4 cents. |
| 3 lbs. bran at 1c | 3 |
| 2 lbs. oil meal at 1$\frac{1}{5}$c | 2$\frac{2}{5}$ |
| 1 lb. oats at 1$\frac{1}{2}$c | 1$\frac{1}{2}$ |
| 30 lbs. ensilage<br>20 lbs. fodder } at $\frac{1}{20}$c | 2$\frac{1}{2}$ |
| 6 lbs. hay at $\frac{9}{10}$c | 5$\frac{4}{10}$ |
| Cost of ration | 18$\frac{8}{10}$ |
| To this must be added 5 lbs. straw at $\frac{6}{10}$c | 3 |
| Labor | 5 |
| | 26$\frac{8}{10}$ cents. |

Result.

Milk, 7 days...143$\frac{1}{2}$ lbs. Butter made, 7 days..6 lbs. 7$\frac{3}{4}$ oz.
per day... 20$\frac{1}{2}$ lbs. " per day........ 1 lb.

Quantity of milk per pound of butter, say, 20 lbs.

| | |
|---|---|
| Assuming the value of the milk to be 3$\frac{17}{100}$c. per lb. the daily value of the milk was | 65c. |
| Deduct cost of ration | 26$\frac{8}{10}$c. |
| Profit per day | 38$\frac{2}{10}$ cents. |
| The cow, with this ration lost in seven days 50 lbs., or say, 7 lbs. per day. | |
| Assuming the value of flesh to be 4c. per lb., 4x7 | 28c. |
| | 10$\frac{3}{10}$ cents. |

The gain per day, therefore, on that cow was 10c. or, 38c., if you do not count the loss of flesh as of any consequence.

Butter made, 7 days, $6\frac{1}{2}$ lbs.
" " per day 1 lb.

| | |
|---|---|
| Assume value of butter to be $47\frac{55}{100}$ cents | $47\frac{05}{100}$ cents. |
| Cost of ration | $26\frac{87}{100}$ " |
| Gain | $20\frac{75}{100}$ cents. |
| Loss of flesh | 28 " |
| Loss | $7\frac{25}{100}$ cents. |
| | Against Moulton's ration. |

Same cow on Mountain Side ration: 7 days

| | | |
|---|---|---|
| Yield of milk, 7 days | 175 lbs. 1 oz. | $143\frac{1}{2}$ lbs. |
| per day | 25 " | $20\frac{1}{2}$ " |
| Butter made, 7 days | 10 " $1\frac{1}{4}$ oz. | $6\frac{1}{2}$ " |
| per day | 1 " 7 oz. | 1 " |
| Quantity of milk to lb. of butter | $17\frac{1}{2}$ | 20 " |
| Assuming the value of milk to be $3\frac{17}{100}$ cents per lb. Milk value | $79\frac{25}{100}$ | |
| Deduct cost of ration, &c | 34 | |
| Gain | $45\frac{25}{100}$ | 38 cents. |

The cow gained in weight.

The gain for the Mountain Side ration in milk was $45\frac{25}{100}$ cents against Mr. Moulton's 38 cents, or, calculating on the butter basis, $37\frac{38}{100}$ cents against $20\frac{75}{100}$ cents on the Moulton ration, no account being taken of loss of flesh.

From November 12th to December 2d, we fed the Mountain Side grain ration, as detailed above, but substituted dry fodder for ensilage. The dry fodder was the same planting as the ensilage. Not having enough room in the pits we were unable to silo it, and it was allowed to dry in the field.

The average yield of milk from cows fed on the Mountain Side ration previously had been 18 lbs. 3 oz. When dry fodder was substituted for the ensilage the average yield decreased to 16 pounds. 12 ounces.

Under the regular Mountain Side ration, with ensilage, the average yield of butter was one pound of butter to 15 pounds of milk. When the dry fodder was substituted for the ensilage it required 16 pounds of milk to make one pound of butter.

Mr. Appleton: Was there any difference in the grain?

Mr. Havemeyer: None whatever. We simply substituted dry fodder for the ensilage.

From December 2d to December 16th, we steamed the ration, dry fodder being substituted for ensilage. The average yield of milk was 16 pounds; milk required to make one pound of butter, 17 pounds 8 ounces.

Mr. Appleton: You are now comparing steamed fodder with ensilage?

Mr. Havemeyer: I have given the results of three methods of feeding. In each ration the same amount of grain was used.

1st. With ensilage.

2d. With dry fodder substituted for ensilage.

3d. With steamed fodder substituted for ensilage.

In the first case we got 18 pounds three ounces milk, per head per day, from a herd of 117 milking cows fed on the Mountain Side ration.

The dry fodder substituted for ensilage reduced the yield to 16 pounds 12 ounces, and instead of making one pound of butter from 15 pounds of milk, we made one pound of butter from 16 pounds of milk.

The steamed fodder substituted for ensilage gave us 16 pounds of milk and required, to make one pound of butter, 17 pounds 8 ounces of milk.

From December 16th to December 31st we resumed the Mountain Side ration. Our average yield of milk ran up to 18 pounds 4 ounces, and from 15 pounds of milk we made one pound of butter.

Mr. Appleton: Is the weight given there the weight of dry fodder or steamed fodder?

Mr. Havemeyer: We weighed the fodder dry and then steamed it. Of course it grew in bulk.

Gluten meal had been mentioned to us as an excellent substitute for corn meal. We tried it for seven days on "Quail 3d," a prize taker and an extraordinary cow.

| | | |
|---|---|---|
| On the Mountain Side ration she gave in milk in 7 days | 208 lbs. | 8 oz. |
| Same ration, gluten meal substituted for corn meal, 7 days | 219 " | 7 " |
| A gain by the use of gluten meal in milk of, say, | 11 " | 5 " |

But the cow lost in flesh 20 pounds, or three pounds per day. I do not know whether this loss in flesh will or will not be considered of any importance, but I will mention here that every cow that comes to our farm gains, on an average, the first year, 100 pounds, and thereafter maintains her weight.

It may be of interest to the gentlemen assembled to know the proportion of heifer calves born. They are about 50 per cent.

Mr. Wing: Gluten meal, you found, gave more milk than corn meal?

Mr. Havemeyer: It gave about one pound thirteen ounces more of milk per day, but at the expense of loss in flesh.

As an excuse for the details I have given you this evening, I wish to say that I am, and I hope you will be, so impressed with the importance and value of such comparisons as I have made, that I am willing, if the gentlemen present will send me a statement of the rations which they feed, to have them tried, compared with the Mountain Side ration, and give them the results. I do not pretend to say that our ration is the best. I have told you what it accomplishes.

If you will refer to page 155 of bulletin 17, you will find a ration said to cost 33 cents per day, and the claim is made of 320 pounds of butter per cow, or at 15 pounds of milk per pound of butter, 4800 pounds of milk for 11 months or 330 days of milking. I hardly think that statement can be accepted. We have had at Mountain Side only one cow in the herd that milked up to the time of calving. Our cows milk only ten months.

Ration No. 8, on the same page of the bulletin, costing 42⅗ cents per day, is claimed to produce an average of 470 pounds of butter per year. The herd consists of 30 cows, Holstein-Friesan and Guernsey, averaging about 1,000 pounds each, live weight. Cows go dry about six weeks, and come in milk at all times. The average butter per day for each cow is about one and a half pounds.

It may be interesting to you to know what preventives we use for scours in calves. We have tried about everything, and my son-in-law, I believe, has come to the conclusion to let them alone. We have fed the cow with carbolic acid before the calf was born. We have administered different medicines for soothing the bowels. We have sometimes felt very hopeful and have thought our care would meet with success and then suddenly found that we have lost two or three calves. This year we have not experienced much trouble.

Mr. Appleton: You find the results vary with the season?

Mr. Havemeyer: Yes.

Mr. Sturgis: Does it arise from abortion?

Mr. Havemeyer; No, we have little trouble from that cause. For six weeks after the calves are born they are fed from six to ten pounds of milk, or on an average of eight pounds of pure milk per day. After the six weeks they get a reduced quantity of pure milk, and, in place of the reduced quantity of pure milk, skimmed milk is substituted—that is, six pounds of pure milk and two pounds of skimmed milk—with a small quantity of grain. After they are three months old, and until they are one year old, our ration for calves consists of half of that for heifers of one and two years. In other words, they get just half what a heifer gets.

A Mountain Side ration for calves between three months and one year would be

1 pound of bran,
2 " ground oats,
1½ " hay,
5 " ensilage.

We calculate the cost of food fed to a calf until it is one year old to be eight cents per day, and allowing two cents for straw and two and one-half cents for labor, the total cost is 12½c. per day.

Mr. Cannon: Do you give your calves milk the whole year?

Mr. Havemeyer: No. The expense attending calves until they are three months or 90 days old is 25 cents per day, or $22.50, and for the next nine months or 275 days it cost 12½ cents per day, or $34.32; the total cost when it reaches the age of one year being $56.82. When between one and two years of age they are kept four months on pasture and are fed only 240 days. The average cost of the feed is 15½ cents per day, or for the 240 days $37.20. Consequently the heifer, when she comes in milk as a two-year old, has cost us $94.

The Mountain Side ration for heifers between one and two years old is

| | | | | |
|---|---|---|---|---|
| 2 | pounds | bran at | 1 cent | 2 cents. |
| 4 | " | ground oats at | 1 " | 4 " |
| 5 | " | hay at | $\frac{9}{10}$ " | 4½ " |
| 10 | " | ensilage at | $\frac{1}{26}$ " | ½ " |
| | | | | 11 " |
| | | straw | | 2 " |
| | | attendance | | 2½ " |
| | | | | 15½ cents. |

It may be of interest to you to know the weight of the cows fed with the rations mentioned. The weight of Zena 2d, before she commenced with the Holland Patent ration was 1,020 pounds. She was a fine cow. On ending the test her weight was 930 pounds, showing a loss in flesh of 90 pounds. Doe Magna had lost at the end of her test 50 pounds.

In the above statements of cost of rations you will notice that no deduction has been made for the manure produced. If you will read the report of the Agricultural Experiment Station you will find that in some instances there is deducted as much as 11 cents from the cost of some of these rations, as value of the manure, in one case the cost of the ration being only 14 cents.

I have brought with me a printed table which we use to record the yield from the cows. The names of the animals are printed, with horizontal lines to keep separate the pounds and ounces of the night and morning milk. The pails are tared (four pounds in our case), and the tare adjusted in the scale so that the man can read from the dial the exact weight of the milk. These tables cost two dollars and a half for the entire month. The cows, names are alphabetically arranged. From these records the yield is copied into the herd book, by which an accurate record of each cow is kept.

I am exceedingly obliged to you, Mr. Chairman and gentlemen, for the close attention you have given my remarks. I hope what I have said has at least been interesting and may lead others to follow my example and bring with them here the results of their feeding. I should certainly prefer to listen to the statements of other gentlemen present on this subject of cattle feeding and its results, and I am sure their experience would be of more value than that to be obtained from outside sources.

Mr. Cannon: It is evident, in the very interesting address Mr. Havemeyer has given us, that he has carried into his farming the same accuracy and careful attention to details which has brought him success in his commercial life. In other words, the great object has been to determine what would produce the largest possible net result for a judicious expenditure of money. Mere success which comes from the putting of a pound of gold in one scale and a pound of meat or of butter in the other has evidently not entered into his system. In this case Mr. Havemeyer has proceeded with a system from which he derived the most elaborate statistical information. He has not accepted the decrees of scientists, but, in trying their experiments, he has instituted for his own information a system of inquiry which has been most valuable. I do not know whether Mr. Havemeyer is ready to assert that all his tests would come within the comprehension of the average American farmer; but, as he proves, you can only arrive at a satisfactory result by making comparisons. We have with us this evening one of our most eminent farmers and most successful breeders; a gentleman who may be congratulated on being the owner of the most distinguished butter making cow the world has ever seen, Eurotisama. I apprehend that the Farmers will not be satisfied until they are told how he obtained those marvelous results. It is probable they were not entirely due to the quality of the animal, but that not a small measure of his success must be attributed to treatment and diet. I therefore call upon Mr. Appleton to make a full confession of all he knows, and to give us the benefit of his experience.

Mr. Appleton: Mr. President—I shall be very happy to comply with your request; but I want to say before I begin that I have listened with very great interest, as I have no doubt have all the Farmers present, to the statement made by Mr. Havemeyer and the statistics which he has given, which indicate the painstaking manner in which he has investigated the subject before us for discussion this evening. The tests which he has made with his cows have resulted in knowledge which will be very valuable not only to us but to the entire dairy interest. I am sorry I cannot now do as he requested us all to do—that is, give our comparative tests, with the results, in order that they may be compared with his tests and results. No doubt other gentlemen present will do so, as I shall be happy to, at a future time.

I have prepared a few remarks upon a different branch of the subject, which I will read. They relate to the matter of testing cows for the highest results.

Mr. President: You have asked me to speak of "The Feeding of Cattle." In doing so, I must confine myself to dairy cattle, and particularly to those of the Jersey breed, for I have no experience with, or special knowledge of, any other breeds; and as I have not been in the habit of noting the effect, in increased weight of the cows, of the different rations given them, I cannot be expected to speak of the product in beef as the result of feeding.

The question I am asked to consider is this: How much food, and of what kinds, have I found, in my experience, to be best to produce the desired results in milk or butter?

In other words, what is a safe, sufficient and economical ration for dairy cows? If you who are horsemen, were asked how much oats and clean hay were sufficient to secure in the horse the highest results on the turf or track, you would, I think, answer: "That depends on the horse," *i.e.* on his breeding and training; and so I answer your question to me; "that depends on the cow"—as much on her breeding and on the training she has received, as in the case of the horse.

It is estimated that any well-bred Jersey cow, that is, one in whose pedigree, close up to her, are to be found great performers in butter; and one that is of mature age, and in good condition, may be trained to produce at least 14 pounds of butter within seven days, on the following ration, viz:

Eighteen pounds of grain, of equal parts corn meal, ground oats and wheat bran or middlings, (substituting occasionally, perhaps, one pound of oil meal or pea meal in place of an equal weight of corn meal); and pasture, hay or ensilage at the discretion of the feeder, and according to the season.

Here, it will be observed, I have given a ration which, it is thought, will produce satisfactorily large results; but upon certain conditions in the cow, one of which is that she is properly trained. Some one may ask what is meant by "training a cow?" I answer; It is to develop her natural, inherited capacity for assimilating and digesting rich, butter producing food, thus stimulating the tendency to richer milk secretions.

The method employed in this process of training is simple enough. It consists in gradually increasing the quantity of rich food, from week to week, as the cow may be able to take it; or, perhaps, continuing high feeding without any increase for some time. Well-bred cows which are capable of ultimately yielding large products differ much in respect to the time required in training them. I will give, as instances of the extremes in this respect, the case of two cows that I have tested: one, my cow "Eurotisama," who, after her first calf, was able to take the maximum quantity of food at once and soon produce over twenty pounds of butter in a week. The other was a cow similarly bred, which could not, after her second calf, take half as much food as the first one, and was only able to yield about fourteen pounds of butter in any week, that year; the next year she did better, both in quantity of food taken and in product of butter; but the next year after that, (*i.e.*, after her fourth calf) she was able to consume the maximum ration and produce about twenty-four pounds of butter in a week.

I should add here that in the meantime, throughout those two years, she was constantly fed with reference to inducing her to take a larger quantity of rich, butter-producing food.

As for the kinds of food best adapted to produce butter, it is generally agreed that corn meal leads all the rest. But we must not, therefore, conclude that no other grain should be used. There must be what is called a "well-balanced" ration—which, I may safely say, is agreed to be what I have given, viz.: one-third each corn meal, ground oats and wheat bran. A large ration, composed exclusively of corn meal, would soon sicken the cow. The aim is to induce the taking of the largest quantity of the corn meal that she can stand; and this is best secured by the mixed or balanced ration. The use of any tonic or condiment whatever is to be avoided. When testing cows on my place we never use an ounce of anything of that nature. Nothing goes into the cow's mouth but what is mentioned here as the ration.

You will have noticed that I have made no account of the cost of food, or profit in the feeding, but have confined myself to one branch of the subject, that is: High feeding for great results. I leave the other branches of the subject to other gentleman present who, I know, are better qualified to speak on the question of average rations for a herd. Mr. Havemeyer, I may say, has preceded me here, as I knew he would.

Mr. President: At the last meeting of the Farmer's, you said that I would be expected to make a statement of the feeding of my cow "Eurotisama," during her great and triumphant test for a year. So I will conclude by reading the account of it, which was published soon after the test was concluded.

"Eurotisama's feed was also carefully noted, from the beginning to the end of the test. It would be tedious and of little use to give it here in detail, as it was not much varied from week to week, excepting at long periods, or for some special reason of her condition. She began with 24 pounds of grain per day, of one-third each corn meal, ground oats and wheat middlings. This was reduced after a month to 21 pounds, in the same proportions, which, for most of the period thereafter, continued to be the ration. It was, however, occasionally raised and dropped again for special reasons. At the end of the fourth week, bran was substituted for middlings, and continued, I think, with advantage in the change. The grain was invariably mixed with cold water, and some portion of the ration was generally spread upon hay or ensilage. The above was the maximum and minimum quantity of grain, excepting that during the last month it was, for a little while, reduced to 19 pounds. It should be stated that sometimes one pound of oil meal was substituted for the same quantity of corn meal, but with no effect that could be observed. In addition to the grain, the cow's feed was as follows:

"During the season—that is, during the summer season—about three hours per day, of fair pasture, and what hay she would readily take. After the season she was kept in the barn all the time, excepting for exercise every fair day, and her feed then was cut and steamed hay and ensilage, generally some of both each day, and always with a part of her grain rations mixed with it. The hay was not weighed, but given in such quantity as she would readily eat, and about one-half bushel of ensilage; and each day a peck of either carrots or beets, the carrots being preferred by me."

I may say here that the suggestion was made to me by some distinguished feeders from the West that it would not do, in a year's ration for a cow, to give, unlimited, even the best blue grass pasture, because grass was not the most productive butter making food, and she would be likely to over-eat of the pasture, and therefore not take as much grain as she should. I followed that suggestion, and, as I say here, she was given only three hours per day of pasture and what hay she would readily eat. This answers Mr. Havemeyer's question as to the quantity of hay given. We never weighed the hay given to the cows. We generally give them all they will take after, but not before, they have had their other food, because if the hay were given first they would gorge themselves with that and not take sufficient of specially butter producing food.

From the time of her preparation for the test—that is, from the time she calved—until the end of the test she gained about 200 pounds in weight. She weighed, five months after the test began, at a time when she was not supposed to be at her best, 820 pounds. She is, as you see, a small, light cow.

I have given you, Mr. President and gentlemen, my experience in feeding a cow for the highest results. This is a limited branch of the question before us to-night, I know. The other point, of which Mr. Havemeyer has treated, is of more general importance, but some feeders and breeders of Jersey cows believe that it is of great value to the dairy interests to ascertain what is the maximum capacity of the cow. They believe in the wisdom of endeavoring to secure that information and think they are entitled to use for that purpose all means within their power. It has sometimes been asserted that cows are injured by this process. I am not sure there is no foundation for that assertion. I have been told that the great cow, "Landseer's Fancy," previous to "Eurotisama's" highest test, was injured by the operation; but, although she was thirteen years old at the time, she continued to be a breeder, and also continues to this day to be a producer in large quantities of milk and butter. The great difference between her and any other cow is in what is called "richness." She made more butter from the same weight of milk than any other cow ever known. She has been known to make a pound of butter from less than four pounds of milk. But in comparing tests we only consider quantity of butter made without regard to quantity of milk. As I said before, no complete statement was ever made as to the quantity of food she took during the year.

Mr. Cannon: What was the greatest quantity of milk that Eurotisama gave?

Mr. Appleton: I shall have to answer that that is all given in my published statement, the remainder of which I will read, if you wish, although it relates to some other matters connected with the test besides feeding. I will read it all.

"The following is a statement of the test of my cow, Eurotisama, 29,668:

"She made in one year, from April 22, 1889 to April 21, 1890, (both inclusive) 945 pounds, 9 ounces of good, merchantable butter, salted one ounce to the pound.

"Through the year the butter was churned only once a week. Her best week was the eighth, which weighed 27 pounds, 1½ ounces, and has been so registered. The best four weeks was from the eighth to the eleventh, which produced 97 pounds, 1½ ounces. The first three months were the largest, and produced 290 pounds, 1½ ounces, or about 3 pounds, 3 ounces per day. The first six months made 547 pounds, 9½ ounces, or an average of a fraction of an ounce more than 3 pounds per day.

"Each milking throughout the year was weighed, and the record observed, but I deem it sufficient to give here only a general statement of it, and, for convenience, in quarts.

"The maximum product was about 17½ quarts per day (I will say here that the cows that give the greatest quantity of butter do not give the most milk, generally), which continued until the twenty-first week, when it fell to, say, 14½ quarts, which again, with slight variations, continued until the forty-fourth week, when it fell to 11 quarts, which, excepting once or twice, when for special causes it fell a little below that, was the minimum; but it never rose much after each drop. The circumstances attending these declines in product of milk will appear forward when the corresponding falling off of butter is noticed."

I will jump over what I have already read this evening, with your permission, and read another paragraph.

"She weighed in October 820 pounds. She dropped a bull calf, by Golden Rioter, 15,012, on the fifth of April, 1889, about two weeks before the test began, and was not served until November, when she held by the first service. She was five years old when the test began, and had had only three living calves, all bulls. She lost by abortion, in the pasture, her first calf, where she was overlooked until her udder caked, which resulted in the almost entire loss of one fore teat, only a few drops of milk being at each milking drawn from it.

"Eurotisama was, obviously, a wonderful cow from the first day she came in milk, under three years old. She made her first test for a week, producing 20 pounds, 13½ ounces, when she was two years, 10 months old, 'and still the wonder grew' as she neared the time of calving, and persisted in giving a good quantity of milk up to dropping her calf. It was this persistence in giving milk that led me to try her for a year.

"The incident of most interest during the test was the cow's sickness, produced by eating stolen sour apples during the twenty-first week, which reduced the milk as I have stated, and the butter from 22¼ pounds to 17 pounds, and, although she speedily recovered from the attack, she never increased, either in milk or butter, to the former quantity. Near the close of the test I increased the butter yield by increasing the quantity of corn meal two pounds per day, but this could never be maintained long, as she would, after a little while, refuse to eat the whole of her ration. The result of these experiments was to demonstrate the value of corn meal as a butter feed. The only difficulty was in her capacity at that time, and in her plethoric condition, to digest so much. Excepting as to the sour apples incident, her condition of health was perfect all the time, and continues so since the test ended. Not a particle of anything whatever, either medicines, condiments, or stimulants, was taken by the cow during the year of her test.

"Eurotisama is the double great grand-daughter of Eurotas; tracing also through her sire several times besides to both Alphea and Rioter 2d. I call her a line-bred Rioter-Alphea.

"I am particularly proud of having bred both her and her sire, and that I selected her dam and her sire's dam, as calves for the blood that was in them, and for the avowed purpose of trying to produce just such a cow as she is."

Mr. Havemeyer: I will detain you but a moment on what I consider an important point. I have often heard the remark made that it does not pay to keep cows; that all these tests are nonsense, because you do not get back what you have put out I have listened to Mr. Appleton with a great deal of interest. I want to show you, on the figures given, whether or not it pays. The only unknown factors, as far as I can learn, from the statement, are the quantities of hay and ensilage given to that cow.

Mr. Appleton: I gave as the quantity of ensilage, half a bushel—about 30 pounds.

Mr. Havemeyer: And how much hay?

Mr. Appleton: As much as she would eat; I never weighed it.

Mr. Havemeyer: Three pounds?

Mr. Appleton: I think she never took more than two pounds a day.

Mr. Havemeyer: Then Mr. Appleton's ration, if it consisted of six pounds of corn meal, six pounds of ground oats and six pounds of wheat bran, with seven pounds of hay and 30 pounds of ensilage, cost 29 cents per day.

Mr. Appleton: You have taken the ration I gave as an estimate of what might be done with any good, well-bred Jersey cow, but the ration that this cow had was more than that. Eurotisama had, at one period, eight pounds of corn meal, eight pounds of ground oats and eight pounds of wheat bran.

Mr. Havemeyer: I will take those figures, then. Adding three cents for straw and five cents for labor, her ration cost 44 cents. The average yield of butter per day was two pounds, nine ounces. Taking my price per pound for butter 47 $\frac{55}{100}$ cents, the value of her product per day was $1.23. That cow, therefore, made on butter, net, 79 cents per day. Her milk product we will take, at the maximum given for six months, as 35 pounds per day. Taking the figure I used in my calculations, 3 $\frac{17}{100}$ cents per pound, we find the result to be $1.42 per day income on milk. Deducting the cost of the ration, etc., 44 cents, we find that Mr. Appleton would have received net per day, for his milk, about 98 cents. That answers the question whether it pays to feed cows, even with this ration of Mr. Appleton's, which is by many considered to be enormous.

Mr. Appleton: But Mr. Havemeyer should remember that I stated in the paper I read that I never had another cow that would take that food for a whole year.

Mr. Havemeyer: Eight pounds is Mr. Appleton's limit of corn meal. My ration is eight. He gives eight pounds of ground oats. My ration is four pounds. He gives eight pounds of wheat bran. My ration is two pounds of wheat bran.

Mr. Appleton: You said six. It should be more. Eight pounds is the maximum and seven pounds the minimum. The average is seven and one-half pounds.

Mr. Havemeyer: Then I fed one-half pound more corn meal, five and a half pounds less wheat bran and three and a half pounds less ground oats than Mr. Appleton did.

Mr. Appleton: I wonder the average of your herd could take your ration of corn meal per day.

Mr. Havemeyer: How are we going to reconcile these two things? Mr. Appleton says corn meal is a great thing, if the cows will take it.

Mr. Appleton: Excuse me for saying that I should put in more bran and less corn meal.

Mr. Havemeyer: The expense is the same, so far as the question of expense is concerned. They each cost one cent a pound. My cows get two pounds of oil meal, and that you do not give to yours.

Mr. Appleton: I did not suppose a large herd would take on an average six pounds of corn meal a day.

Mr. Havemeyer: That is sufficient. The famous cow, Mary Anne, of St. Lambert, had three times that amount during her test.

Mr. Cannon: Before we proceed to ask gentlemen to give their experiences with reference to a proper diet for growth of flesh, I wish to express our satisfaction at having with us one of the oldest breeders of Jerseys, Mr. Wing, whose experience in regard to feeding and producing butter, is one of the longest of all the Farmers present. I do not know whether he has kept abreast of all these recent experiments in rations, but I am inclined to think that, being one of the most astute, careful and successful farmers among us, it is more than probable that he can enlighten us. As Mr. Havemeyer says, it is only by comparison that we can arrive at results. I call upon Mr. Wing to give us the benefit of his lengthy experience.

Mr. Wing: I am very sorry, Mr. President, that I cannot give you any information on the subject. I never tested cows except on grass, to see what they would do in their natural conditions. I have had some cows that would produce 16 pounds of butter a week, on grass. As to the feeding, I have always given them all they wanted.

Mr. Cannon: We have arrived at a period of the discussion when we should endeavor to reach some determination as to the relative economy to the Farmers of keeping and feeding a strain of blood with quality to secrete milk or make flesh, and upon this question I know of no one among our Farmers who has had a wider experience than Mr. Sturgis, and I now call upon Mr. Sturgis to sustain the meat producing interest.

Mr. Sturgis: Mr. Chairman and gentlemen: Not anticipating that I should be called upon to speak, and believing that the debate would be principally devoted to the milk question, I have not prepared anything of an elaborate character to submit to the Farmers. The whole subject, however, is one that interests me very much, and I may say that our debate this evening has been more peculiarly interesting to me than that of any previous evening which I recollect. This is naturally so because the business of feeding and handling cattle has absorbed more or less of my time and efforts during some twenty years of my mature life.

If you will allow me to diverge for a moment from the questions before us, I will say that I have been reminded of an incident narrated the other day in the papers as occurring during the delivery by an Eastern minister of a sermon in Colorado. It seems somewhat appropriate here because of the importance which has been given this evening to the animal side of creation. The minister was preaching upon the parable of the prodigal son, and, having narrated the experience of the young man, and the manner in which he had wasted his inheritance, and the story of his return to his father's house, with empty pockets, dilapidated garments, and depressed spirits, the minister who had noticed in the congregation a cowboy regarding him with close attention, and thought a personal appeal to him might bring out something of interest, turned to him and said: "My friend, if your son was coming home to you in that way, with little or no clothing on his back, having spent all the money you had given to him, having lived in the manner I have narrated; and if you had in your barn a fine fat calf, which you could devote to making your son's return cheerful, what would you do?" The cowboy replied energetically, "I would shoot the boy and raise the calf," and I think he was about right. A gentleman of my acquaintance received a letter from the superintendent of one of our higher academies not long ago, stating that his son was not all that he should be; that he was not making the progress he had expected of him; and concluding with "I feel rather loath to intimate that he should return home, but if he cannot improve in his studies I leave it to your judgment to decide upon the better course." The boy's father wrote back: "I shall not spend a thousand dollars a year on a two dollar boy. Send him home."

But to return to the subject: I have been very greatly gratified in hearing brought forward this evening what I have always regarded to be the basis of feeding for beef or feeding for milk; that is, the inestimable value of corn meal in producing those results. I was delighted to hear for the first time the ration given by Mr. Havemeyer to his cows; and I could not avoid smiling over the contrast between that ration and what he termed the Collier ration. I should think the cow, from the amount of butter produced under the latter ration, did well if she only fell off 90 pounds in flesh in the time specified. Beef and milk are, to a certain extent, I think, synonymous terms. That is to say, what produces in one animal these enormous yields of butter will, in another of different qualities, produce comparatively as large results in beef. You know the quality of the Short-horn breed; there is the Booth family, which is the beef making branch, and there is the Bates family, which is the milk producing one. I have had some magnificent cows of the Bates family, which combine both qualities to a considerable extent.

My practical experience in foods has been entirely directed to the production of beef. I have, for a number of years, been obliged to give very practical attention to that subject, and my experience has been gained in the extreme West, where the question of ensilage is eliminated from the proposition. People there have an enormous amount of rough forage which they can use, and they rely, to a great extent, upon their Indian corn. Ensilage has never been tried, so far as I am aware, West of the Mississippi river. I am personally a strong believer in the merits of ensilage, but I have never had the opportunity of seeing it tried.

There are several substitutes for corn meal which are employed in the West, where cattle are fed in large numbers. The use of them arises not so much from the desire to fatten cattle as to utilize what otherwise would be wasted. Attached to every distillery in the West is an immense series of cattle stables. The cattle are fed almost exclusively upon the refuse which remains from the mixture of corn, oats and what-not after the alcohol is extracted. What is called the "slop," which is a sour liquid—the remnant, as I say, of the distillation of the alcohol or high wines—is a food which contains a certain amount of nutrition. This has to be utilized in some way, and in the West the plan of feeding this to cattle has been devised. It is not a good food, and I will but very briefly touch upon it. It is fed in a liquid form, and is sold by the bushel of liquid, namely, the liquid which comes from a bushel of corn after distillation. The animal is supposed to take about an even bushel of liquid in the course of a day. It looks not unlike corn meal highly diluted with water, so much so as to resemble yellow soup. You will, of course, at once see that it is far too liquid in quality to give to a bovine. It does not pass at all into the rumen, which requires solid food, but goes directly into the second stomach, giving only the minimum amount of nutriment to the animal. Still, under that process of feeding, the animals gain sufficiently to justify the feeding of that material at an expense of about five cents to six cents per day, for which price it can be procured.

Western cattle are also fed extensively upon the refuse of starch factories, and they are also to a considerable extent fed upon the refuse of glucose factories, the refuse in both cases being something of the nature already described, and being fed in a liquid form. I have for a series of years tried experiments with the different methods. I have not at hand the data to enable me to state what the result was with my distillery feeding. My recollection is that with between three and four thousand beef animals I put on them an average gain of 180 pounds to 190 pounds of flesh in about five months, and that the cost was six cents per day for the "slop." Allowing for hay and attention, the cost was probably eight or nine cents per day per head. But that is not a record which would be of interest to you, except in the way of curiosity.

In the West we had no authorities to whom we could apply upon the question of food. I may be wrong, but in the books which I was able to consult I could not find, and I do not now know in what book I could find definitely stated, the proper ration for a beef animal based upon the materials which are accessible in the West. The books either do not state exactly the amounts which can be given, or they include in the rations given two or three ingredients which are not easily procurable with us. The English books invariably include one or two kinds of grain food which we cannot obtain. What their equivalents would be it is a little difficult to say.

But I went to work and evolved from my inner consciousness a ration which I feel rather flattered to find is not dissimilar to that which the experience of Mr. Havemeyer has led him to adopt. I have here on a single sheet of paper, the results of the feeding of some 8,000 cattle.

During the year from August 1, 1886 to July 31, 1887, I fed 8,000 animals, consisting of 4,300 young steers and 3,700 dry cows. The steers were light, weighing in at 856 pounds. They were coming three years old that spring and summer, of the ordinary Western breed, taken off the range. The cows, which weighed 814 pounds, were from 8 to 10 years old and had stood the shrinkage of a railroad journey of about 500 miles, and were weighed on that shrinkage. The rations are estimated as one feed per day of 24 hours. I fed each of these animals an average of $4\frac{1}{2}$ months, or $132\frac{1}{2}$ days. The gain on the best lot of steers was 360 pounds per head. They rose in weight from 856 pounds to 1,216 pounds. As is the custom with us, we took them out of the barn and stood them for 12 hours in an empty lot, and then weighed them before they were loaded upon the cars, The cows went in at 814 pounds, and came out at an average weight of 1,126 pounds, having gained 312 pounds per head. During the period mentioned I fed 9,809,961 pounds of corn, 1,742,040 pounds of bran, 2,088,578 pounds of linseed and 7,919,945 pounds of hay and salt. The cost of these various materials I will briefly detail to you so that you can compare them with relation to the cost of the same materials here in the East.

The corn cost me on my scales 28 cents per bushel; the bran $11.00 per ton; the linseed, or oil cake, $18.40 per ton; the hay and salt—and of the salt I fed about 30 tons—$5.50 per ton. The cost of feeding and handling jointly was $112,965.27. The average cost of daily feed to each animal was $10\frac{67}{100}$ cents.

Mr. Havemeyer: Does that include feed, labor and everything?

Mr. Sturgis: That includes the food, the cost of the men in the barns, the labor of loading and unloading and the distributing of the food, etc., but it does not include the taxes, insurance and superintendence. I have the managerial cost in a separate item. It amounted to $2\frac{33}{100}$ cents per day. Including in the total cost the cost of management, insurance, taxes, etc., the average expense per day per head was scant 13 cents. The cost for the length of time each animal was fed, (an average of $4\frac{1}{2}$ months) was $17.17.

The ration consisted of four articles, corn, bran, oil cake and hay. Of the corn I fed $9\frac{25}{100}$ pounds. Mr. Havemeyer feeds 8 pounds. Of the bran I fed $1\frac{64}{100}$ pounds; of linseed cake $1\frac{97}{100}$ pounds and of hay $7\frac{47}{100}$ pounds. Mr. Havemeyer feeds exactly 2 pounds of bran, 2 pounds of linseed and 7 pounds of hay. So that I, fortunately, arrived at very nearly the same ration Mr. Havemeyer uses for his milk cattle. The corn varies only about one pound from his ration, while the bran, linseed and hay are the same, or within a small fraction of it. The total number of pounds of food in hay and grain in one ration was $20\frac{33}{100}$ pounds divided into three parts throughout 24 hours.

The money result of the operation depends, of course, upon the amount at which you charge your cattle to the barns at the time you put them in. As we had raised the cattle and put them into the barn that is a factor which is, of course, dependent upon the judgment of the feeder himself. We charged the cattle to the barn at $30 a head, which was practically 3½ cents per pound. They weighed about 850 pounds, and cost us, as I stated, between $17 and $18 per head to fatten. Adding the cost of getting them to market—railroad charges, etc., about $6—brings the figure to about $23 or $24 besides first cost. That would make the estimated cost at the time they reached Chicago, about $55. They brought something over $60, I think about $64 or $65; a small result, considering that the feeding was done cheaply. It is a small margin. They weighed, as I have said, 1,216 pounds, and brought, probably, a trifle over 5 cents per pound on their feet, live weight.

Before closing I will mention one further matter, which is, that there is an element that enters into feeding under these circumstances which, perhaps, does not obtain to the same extent here. Food, of course, has to perform two duties. In cases where the animals are exposed to cold there is needed the food which will sustain the animal heat at its normal point, and there is also required the food of production. You, of course, have warm barns and keep your animals at a temperature which requires but little need of the food of support. In the usual feeding, a certain amount always goes to the sustaining of the animal heat, and that would permit them to utilize a larger grain ration; as a consequence of this I will state that the feeders who fatten their animals in open lots expect them, when on full feed, to eat a bushel—56 pounds—of corn a day, showing that these theories regarding the inability of the animal to utilize that amount of food are not theories merely, but are founded upon facts. I may add that, when this enormous ration is used a portion of it is found to pass through the intestines undigested, coming out whole, and in sufficient amount to support two hogs from the refuse and fatten them for the market. Feeders calculate, if they get the value of their hogs clear, fattened in this manner, and if the beef animal simply pays for his original cost and the grain that goes into him, that they have done well by realizing as profit the value of the hogs. This has reference, of course, to feeding in open lots only, where the cattle are exposed to the full effects of winter weather.

In order to get at the question more in detail, I, several years ago, spent a number of days, at his home on Lake Erie, with Prof. Stewart, who is the author of Stewart's "Cattle and Cattle Feeding," and who, I presume, is one of the best authorities in this country. He gave me some very interesting details with regard to the proper method of handling weak cattle, the kinds and amounts of food which should be given to bring them up to a strong condition, and also, especially, with reference to the handling of calves. They were the results of careful experiments by himself, extending over a series of years. But I will not detain you upon those matters this evening.

Mr. Appleton: If you will allow me, temporarily, to assume the office of toast master, I would like to say that our worthy President has had a good deal of experience, as I understand it, in the feeding of cattle, and especially, with respect to the production of meat. I feel sure that it is only his modesty, and the position in which he finds himself, that prevents him from entertaining and instructing us with an account of the results of his experience. I hope he will consent to give us some statement of those results.

Mr. Cannon: The earliest importations of high bred cattle were Short-horns of Bates blood, as they combined in a higher degree the power of secreting milk and making flesh than any other strain of blood, and as the greater profit in breeding was the increase and rapid development of the herd, my desire was to ascertain the proper diet, especially for the raising and forcing of young stock, and the production of meat; and as I could get no statistical information in this country I visited England and spent nearly a whole winter there in the effort to learn the diet treatment and cost of making a pound of meat, and the agency which had produced results in growth and development which the Short-horn attained, beyond great skill in breeding. Such information I failed to get, even from the most eminent breeders. They told me they fed their cattle all they would eat. That we can do on this side; that can be done anywhere: but, being a Yankee, I wanted to ascertain how I could produce the best results with the least expenditure of money. I determined that the only way to solve the matter was to institute a system of weights and measures for daily diet and weekly weight of the animals.

The starting point was the raising of young stock. Calves were taken from the cow within three days after calving and brought up by hand, and weighed at one o'clock on every Saturday. We commenced a system of diet, only limiting the quantity of the daily ration by the condition of the digestion of the animal. So long as the digestive powers continued perfect we did not hesitate to increase the amount of the ration. After a period of a year's experiments we found that, with the Short-horn breed, we produced the best relative results with the least expenditure of money, by an average growth of two and a half pounds a day. In a single instance we carried our experiment to the extreme on a two year old bull, and for an entire month, reaching between six and seven pounds gain a day, an increased weight of 187 pounds in 30 days. We found also that while it was comparatively easy to get them up to a high state of accumulation of flesh, it was difficult to let them down again. The temperature of the animals was taken and recorded daily. So long as temperature was normal and food digested the largest ration was served, or on the contrary diminished. If the weather was equable during the entire week, the growth would be large, if on the contrary, it had been variable; extremes, either of cold or heat, the growth would be small. Temperature had a great influence upon digestion and simulation.

After disposing of the Short-horn breed we went into fattening of steers. As we could get no information from farmers with reference to the cost of fattening steers, I took a herd of 90 odd steers, divided them into three lots, as equally as to weight and condition as possible. One of those lots was treated as the average Vermont farmer cares for his stock—put into an open shed, feeding 20 pounds of hay and 3 pounds of grain daily, with a run in the yard, and the open shed for shelter. Another lot was kept in a warm stable and fed precisely the same ration of hay and grain, with a peck of mangels. The other third was fed 70 pounds of ensilage and the same quantity of grain.

Mr. Sturgis: Were they under cover?

Mr. Cannon: Yes. A daily record of temperature was registered of the two lots. We found the temperature of the animals fed on ensilage scarcely varied, remaining normal; whereas, the temperature of those that were fed on hay, mangels, etc., was variable. We also found that the coat of the animals fed on ensilage had a healthy sheen, quite different from the others; that the quantity of water they drank was not above one-half that of the other cattle. The animals were weighed every month, and at the end of the experiment we made a practical test of the relative value of the lots. A dealer from Boston appeared as a purchaser for shipping. He bargained to select 50 animals out of the 90 at six cents a pound on the foot, at the farm, weighed in the morning before feeding. He selected every one of my ensilage fed animals, and the balance from those that had been sheltered, and refused to buy the balance at five cents a pound. The feed of these animals cost me relatively, as follows: The hay valued at $10 a ton; the grain at $22; the value of the bran $17 a ton and the mangels 25 cents a bushel. The ensilage fed animals cost me 16½ cents per head per day; the gain in weight was 11½ per cent., but the increase in quality was 25 per cent. The gain of the animals sheltered, and fed on hay, grain and mangels, was 8½ per cent.

Mr. Havemeyer: Was that the gain in weight and the gain in quality, 20 per cent.?

Mr. Cannon: Gain in weight. The daily cost of ration was 18 cents a head. These steers were two year olds, and, when bought, averaged about 1,000 pounds. These steers were bought in the month of November and sold in the following month of May. The lot wintered outside made a gain of only 2½ per cent in weight and nothing in quality. They rather deteriorated. In fact, they were wintered as the average farmer in Vermont treats his stock; simply living through and from their low condition half the summer is spent before they pick up. We have followed this system for some four or five years, dropping out those in the open shed, and have demonstrated that, with a 70 pound ration, an animal fed on ensilage at a cost of $\$1\frac{75}{100}$ for ensilage and a cost of $10 a ton for hay is an economy in six months' wintering of $6 per head, without estimating the value of a greater volume of manure got from the animals fed on ensilage. One of my neighbors, who has made a practical test of the relative value of ensilage manure and hay manure, informs me that ensilage manure has greater fertilizing quality; it carries more nitrogenous matter.

I buy animals in the fall of the year at an average cost of about $28.50. I turn them off in the months of May and June at an average of nearly $60. In this way I feed out the poor hay and ensilage and sell the best hay at the highest market price and accumulate a large volume of manures to put back upon the farm. Is it possible to keep up a farm except the greater part of the fertilizer is produced on the farm, which can only be done by keeping the farm heavily stocked?

Further discussion on the subject was had, in which Mr. Herbert Wadsworth, Mr. Walter L. Suydam and others participated.

The topic selected for the next meeting was "Fodder Crops."

The "Farmers" then adjourned to Tuesday, February 17, 1891.

# The

# "New York Farmers"

MET on February 17, 1891, at "Sherry's," Mr. Le Grand B. Cannon presiding.

In opening the proceedings Mr. Cannon said:

Gentlemen of the "New York Farmers," before proceeding to the consideration of the topic selected for the evening's discussion, it gives me great pleasure to be able to say that we have with us our honored and esteemed Vice-President, who has been prevented, by the accident which we have all so much regretted, from attending our previous dinners. I know how glad you are to have him with us again; and, as I fear that any response on his part would cause him additional fatigue, I propose that we drink his health, with our best wishes for his complete and speedy recovery.

[This toast was heartily responded to, and Mr. Jay afterward arose and briefly addressed "The Farmers," thanking them for their reception and expressing his regret at not having been with them more frequently during the winter.]

Mr. Cannon: Gentlemen, the subject to be considered this evening is "Fodder Crops."

In the duty imposed on me to provide our "Farmers" with experts who have solved the relative value and economies of fodder food I have been fortunate in securing as our guest a gentleman who has given the subject an intelligent study and has arrived at practical facts which are accounted as of high value in successful feeding.

I have the honor of introducing to "The New York Farmers" Col. Hardin, of Kentucky.

Mr. L. S. Hardin said: Mr. President and "New York Farmers:" Leaving to others, who are better posted than myself in chemistry as an exact science, the treatment of fodder crops from an analytical point of view, I will briefly recite my own experience with fodder crops in the dairy, as well as some facts in this line that I think interesting, garnered in the course of many years' service on the agricultural press.

I am informed that the subject under discussion to-night is "Fodder Crops and also Food." This, as I take it, gives some latitude to the discussion beyond fodders, as the term is usually understood, and applies to the general "roughness" of the farm, which is any growing crop that is cut in the field, or, in other words, the stalk of the plant with or without the seeds.

While there are numerous plants with good reputations as fodder crops in certain localities, and others that give fair promise of becoming useful in general cultivation, we will leave those either to their circumscribed homes or to the experiment stations. Our business is with those we already have in hand and yet know too little about.

Gentlemen, have you ever considered the wonderful revolution in the use of fodder crops on the farm that has taken place within the past fifteen or twenty years? Perhaps I should not say revolution, but improvement that has come about because those who now practice and reap the benefit of new methods are but as advanced videttes to the grand army of average and indolent farmers, who slowly bring up the rear, contesting every inch of progress made, or new idea advanced, as though it were a bitter and relentless foe. When I was a bare legged boy on the prairies of Illinois and in the cane-brakes of Kentucky, and you were wearing "knickerbockers" on the Eastern hills, hay was the master crop of the farm. The farmer considered that his fate for the year was dependent upon the success or failure of the hay crop, and the biggest prices were paid to the heroes of the farm who could cut the most hay in a day. The mowing machine soon took all the poetry out of the hay field with its business like and mechanical clatter. But with all the speed of machinery the crop was always precarious. First there were endless varieties of weeds that were constantly taking possession of the field. In winter there was alternate freezing and thawing that lifted the roots out of the ground. Then a dry spring and a wet summer shortened the crop, while it always seemed to rain when the hay was in winrows ready to be stacked. Then when the stack was half built a tremendous thunder storm would drive every one to shelter and rain, and rain, until that stack was soaked to the foundation rails. When the hay was clover instead of timothy, all the conditions enumerated above multiplied their evil effects, for clover is a tender plant, especially when once severed from the ground. It bears little handling and no moisture beyond its own superabundant supply.

Perhaps there is nothing particularly novel in these remarks, because they simply describe conditions that are to be seen around us every day, but I trust my hearers belong to those progressive spirits, who have learned to put no trust in the weather but, so far as possible, have made themselves independent even of the bounties, much less the destructive elements, of nature.

The man who trusts his fortunes in the welfare of a little plant, that has to take its chances all the year round in the open field, is standing greatly in his own light when he can just as well take eight months of the year to prepare the soil, kill the weeds as they start and, by constant cultivation, bid defiance even to the scorching drought.

Then when he comes to harvest the crop, he looks for no signs of the moon to tell him how much rain will fall, but goes on in a business like, methodical way, as though the weather were some other man's concern, not his.

Such, in brief, are the conditions that surround the old way and the new. At the same time the new way is not altogether emancipated from the old, for we find the hay crop still cutting quite an important figure on many of even the most progressive farms.

Where roots, ensilage and ground-feed make up the ration, it is still considered "good form" to give a bite of timothy or clover hay after each feed, though it is hard to see why well cured corn fodder, shocked in the field, would not answer the same purpose at about one-fifth the cost.

Having looked over the field in a general way, let us briefly consider the good and bad points of those plants that most concern the "New York Farmers." I will take them in the following order: Grass, Clover, Timothy, Oats, Rye, Barley, Cow-Peas and Corn Fodder.

So far as the dairy is concerned, the pasture is certainly a delusion and a snare. It blows hot and it blows cold. It bloats the cows to-day and it starves them to-morrow. The shade of trees makes the grass bitter, so the cows will not eat it, while it tempts them to lie idle all the day long.

When the grass is rank and luxuriant the cows do not like it, and when it is short and sweet they cannot get enough of it. When the weather is wet the grass scours the cow and injures her health. When the rain refuses to fall the grass becomes dry and brittle and again injures the cow. When the dairyman is fortunate enough to catch the grass just in the right condition, the average cow is capable of doing her best, but the improved thoroughbred, the Eurotisama's, are like Richard III. "born too high" for such conditions. The demands of their digestive and assimilating powers cannot be satisfied with a simple grass diet. The New York and Kansas Experiment Stations failed to find any improvement from feeding meal to cows on good pasture. The trouble was they did not have good enough cows to make the trial with. A boiler capable of furnishing steam enough for a five horse power engine, will give more than a two horse power engine needs, but it will not run one of 10 horse power. A rich pasture will furnish more food than the cow needs that makes but 200 pounds of butter a year, but it cannot satisfy one that makes 945 pounds. The improved cow, say one that yields 350 pounds of butter a year, is a truly artificial creature, and she must be fed in a truly artificial way. Her tastes must be studied and what she wants or needs must be given her.

She also demands a steady supply which the pasture, subject to the freaks of the weather, cannot give. Say what you may in favor of soiling, I have tried it with cuttings from the richest Kentucky blue grass and it failed utterly. To grow the richest crops of grass we must manure the ground heavily. Cows are able to taste the manure in such grass and refuse it, as witness their rejection of the clumps of grass that grow from their droppings in the pasture, unless they are starved to it. They prefer short, sweet grass and eat it to the roots, in preference to the grass that grows luxuriantly in the shade or on richly manured ground.

Green clover is an ideal food for cows, but he would be a reckless man, who would let cows capable ot making 300 pounds of butter eat it up to their full capacity. He would kill them with bloat. Besides, red clover, when fed in abundance, gives a rank flavor to the butter. I have known a store to be filled with the odor of clover blossoms from such butter—which is quite poetic, but there is no money in such butter. Then the clover crop is too short lived to be of much service as food for cows. Like all the heavy seeding plants, it reaches its most nutritious stage just before it is ready to give up its life, and if the weather is dry and hot, this period is ot very short duration.

Timothy is the ideal hay crop for general purposes, but I have never been able to get up much admiration for it as a milk producing food. It is dry and harsh and full of dust. A first-class cow can amuse herself with eight or ten pounds of it a day, but I think she can be better occupied with clover hay or well made cut corn fodder. The hay crop is precarious, light in yield and costly.

Oats as a fodder crop, is a splendid subject for editorial descriptive writing. I have done it myself, building upon a vision of pound cake capped with delicious icing. The oats were to be cut when just passing the milk stage. The green straw, to the cows's taste, represented the body of the cake, while the rich oat at the top was the icing. Alas, I found that when the oat was cut at that stage and allowed to lie in the sun to cure, the straw turned a pure and perfect white, thus putting the icing at the wrong end, while the oat shrank until there was nothing left of it but a dry hard husk. With this plant the straw begins to turn yellow some time before the oat ripens, so that the good farmer lets the crop stand until the straw is the deepest yellow before cutting. There is not sufficient harmony between the stalk and grain to make it possible to cut it in the nick of time for fodder purposes, as can be done with grains of heavier stalks.

Rye is another crop hard, if not impossible, to make a fodder of. The lower part of the stalk is ripe long before the grain reaches maturity, and, while rye is always recommended as a soiling crop, there is so little nutriment in it, when green and immature, it is hardly worth raising for this purpose, though as a ground bite in fall and early spring it has its uses, but, when pastured in the spring, I have often thought it did more harm than good by distracting the cows from their regular winter ration with thoughts of green food that cannot then be furnished.

Barley straw was always a favorite of mine. I have never tried it as a soiling crop, but in order to save the grain for market purposes it is necessary to cut before the stalk turns entirely yellow. The straw seems to have more body than any other grain, and thus makes an excellent straw to cut up and mix with ground feed. The long, sharp beards are often annoying to the cows, even at times getting in their eyes, though I have never had any serious trouble with them.

Cow peas are coming into great favor now-a-days. While I have had no personal experience with them as a cow food, I have every faith in the good opinion that is expressed of them on every side. While they are a southern product, yet they seem to do very well in Canada, and I have had dairymen tell me of great success with them in this State and Ohio. With so much said in their favor by those who have tried them, it is the part of wisdom to give them a trial, on a modest scale at first. The pea, itself, I know is good, for it is a favorite table dish in all the Southern states.

I now come to the last and, in my opinion, the most important of all the fodder crops, the properly grown and preserved corn stalk. In order to secure a luxuriant and early maturing crop, it is necessary to obtain seed from some of the Southern states. The Virginia Horsetooth is a good variety. Make plantings a week apart until there would be danger of the frost catching it. The ground should be rich and well prepared. Make the rows three and a half feet apart, not an inch less, and scatter the grains very thin in the rows, not over a bushel to the acre, and less might do better. Cultivate thoroughly as long as the horse can get between the rows. This fodder is not to be touched with the knife until the grain on the ears begins to glaze. This is the vital point in securing good corn fodder, especially for ensilaging. At this time the stalk contains the most nutriment and the ear is in the best stage for preserving; while it is a chemical fact that a stalk with an ear has more nutriment than a stalk without an ear.

As an ensilage crop, corn fodder has no equal. To state briefly my faith in ensilage I quote my words from *The New Dairy*: "If we could take all the improvements in modern farm life, and add up the benefits derived therefrom, the sum of all of them would hardly reach the full measure of profit the farmer may derive from the well managed silo. This is pretty strong language, but to the careful reader and listener at institutes and conventions, there is a future for the silo little dreamed of by those who are too skeptical or indolent to build them, or even by those who are now using them." At Mountain Side farm Mr. Meyer has just opened a silo that has been filled and sealed for eight years, and he told me that 20 pounds of that ensilage would go as far as 25 pounds of that made last summer. It is the best he ever made and he knows how to make much better ensilage now than he did eight years ago. He now has 2,000 tons of ensilage on hand. Are there not visions of a future "ensilage trust" in this, a syndicate to supply the cows of the Western hemisphere.

From the above brief sketch it is evident that, in my opinion, the old methods of dairying have had their day—when the cows all came in fresh in the Spring, reveled in luxuriant grass through June and July, making a flood of milk and more butter than the market could carry, falling off through July and August and returning to their work again in September and October; then rapidly drying up to pass the winter in absolute idleness, except the struggle for existence in the frozen barn yard with a diet of swamp hay. The cow very wisely adapted herself to that kind of life, and was too busy trying to live to think much about butter making. Under such conditions she did very well if she made 150 pounds of butter a year. That was sufficient reward for such a method of dairying.

The modern methods of dairying are built upon quite another class of cows. To meet these requirements she must yield not less than 300 pounds of butter a year, and the man who owns her must use his brains in furnishing her with everything she needs for accomplishing the best results. He must have her come in milk in the fall, have a warm and comfortable stable, clean and well ventilated, plenty of water to drink, neither too cold nor too warm. Her ration must be not only as abundant as she needs to force her up to her normal capacity for butter making, but it must be well balanced and above all adapted to her taste if she rejects the regular stable ration. The exact temperature at which the stable should be kept and the amount of exercise she needs are open questions. I would say, use some kind of bedding that is a deodorizer, and then keep the temperature near 60° even higher will give better results in the herd yield of milk. So far as exercise is concerned, if properly bedded I do not think that cows need any exercise during the cold months that they cannot get in the stall. The act of giving milk is a depleting drain upon the system, and dairymen are beginning to get their eyes open to the fact that cows, under such conditions, need every comfort and as little exposure as possible.

When the intelligence of man once rises to a full sympathy with the delicate organization of the cow, he will then have learned that his profit lies in the direction of absolute comfort for her, while exposure and discomfort are prolific of every evil that cow flesh is heir to.

Mr. Cannon: After the very admirable address that has been made by Col. Hardin, in which he has steadily gravitated to that great American product, Indian corn—and I think every "Farmer" who has looked into the economies of agriculture to any extent has satisfied himself that ensilage is our great resource for fodder food—I can not help feeling that, considerering the difficulties which attended my efforts to furnish experts on Fodder Crops, it may be fairly said Col. Hardin has exhausted the subject. Under the embarrassments attending these efforts to provide experts upon the subject for this evening, I felt that it was incumbent to give rather an enlarged construction to the subject of Fodder Crops, and to include fodder for both man and beast. With that in view, my attention was naturally directed to the most eminent expert and statistician in this country, if not in the world, on food. It is not only important to determine the elements and the nutritious qualities of food, but the manner of the treatment of foods, and, under that impression, I found no difficulty whatever in calling upon the friend upon my right. It is scarcely necessary to name him, for he is well known to you all. I have the pleasure, gentlemen, of presenting to you Dr. Atkinson.

Mr. Edward Atkinson: Mr. President and gentlemen. I am reminded by the first words spoken upon this "dry subject" by your President to-night, of what an excellent example I am of that kind. I will tell you a story that I am very fond of relating when I want to be relieved of saying anything else. I shall not use it for that purpose to-night, however.

In the great contest in the Sixth District of Massachusetts, when we tried to put Richard H. Dana in Congress in the place of Ben Butler (and did not succeed,) I took part in stumping the district. I went to Salem on one occasion, with a gentleman who is very apt to dine out and to dine as well as I have done to-night. He indulged in what I have not--he took a little too much champagne; and when I was called upon to speak and put in the facts, he put in the fireworks in a very effusive way, so that it was a little difficult to wind up that meeting. The next day I met Collector Russell on the street, who said: "Well, Atkinson, you had a funny meeting at Salem last night." There was a twinkle in his eye, and I saw that he had something to get off on me. He was our Depew in his day. I said, "Well, Russell, what is it?" He replied: "I met an old lady who had been at the meeting and she said it was the funniest political meeting she ever went to: the first speaker was very dry indeed, and the second one had been." Now, whether I will prove to be the first or the second to-night will remain to be seen. I do not think I have a very dry subject. Now to the serious work.

The function of the farm is to provide food for man; and the farmer, especially in modern times, is exhausting science in learning how to compass the nutrition of the soil and the nutrition of the beast, in order to provide food for man. The result of that is such a huge abundance that, through the very abundance of our food, we have become the most wasteful people on the face of the earth. Yet it is an advantage even to be able to waste rather than be subjected to want. From my economic studies of the question of wages I have been led to a final conclusion, that abundance of food is the *antecedent* of high wages and not the consequence; and that the advantage of this country in every branch of industry is that the man may be well fed; and, being well fed, he may become an effective worker.

Investigation of the food question throughout the continent of Europe will prove conclusively that, next to this country, the English and Scotch are the best fed. They are also the most effective workers; they earn the highest wages, and if you go over to the Continent and follow the rates of wages, you will find lower and lower wages as you come to greater and greater scarcity of food. Now, whether that is a coincidence or whether the abundance of food is an antecedent or a consequence, you may judge for yourselves. I am satisfied of this; that the military system of Europe, (which is much worse than our pension system, in that it takes the flower of the men, at their most effective working age, away from the work of production and devotes them to the work of preparation for destruction,) is leading to the destruction of the countries that indulge in that kind of force. It follows—and you may trace it by the statistics of nutrition—that so large a proportion of the working force is taken away from that one most potent productive tool or instrumentality, *the land*, that what is left of the product after the armies are fed is not sufficient to supply the cultivators. As the army must be and is sustained by forced taxation, there is not enough left to nourish the cultivator, and he is becoming a diseased and ineffective laborer. The Pellagra, a loathsome disease, due to lack of nutrition, is devastating whole districts of the most fertile parts of Italy, while anyone who goes through the less productive parts of Germany may see, by the pallid faces and the listless condition of the people, that they are underfed. From that fact, the hunger which is not satisfied, comes nihilism and anarchy and communism, and all the rest of the indications of social unrest.

Therefore I think, in dealing with this question of the food supply for man, I touch the foundation of all reform. Now, how did I begin? Many years ago I had in charge important manufacturing enterprises. During the war I was obliged to study economy in dealing with the operatives, all of whom depended upon the factory or factories with the management of which I was charged; and when, in consequence of the scarcity of cotton, we were obliged to run only four days in the week, and everybody thought they must suffer, I was forced to study the economy of food in order to enable me to teach the people how to live on four days' wages instead of on six, at the high prices of paper money inflation. As a means of acquiring that information, I set apart a boarding house in which 40 people could be accommodated. I had records kept of everything, down to the last match, and I studied how they could be subsisted. The result of that experiment showed how easy it was to feed a considerable body of people at a very small cost, if only intelligence were applied to the work. I did not know very much about the subject at that time, but I was astonished at the result.

After the close of a year of four days' work in the week, which we were compelled to go through with, we went back to six days' work; and the operatives informed me through the agent that we had taught them so much that they found they had been better off on the wages of four days in the week than they had been previously on the wages of a full week. My functions changed subsequently, and then, as underwriter, it became my function to teach how to build factories that would not burn up. I was going about among the factories about five years ago and I saw a workman opening a dinner pail. When I saw the indigestible mass of cold victuals which that man was about to eat for his dinner, it brought back my interest in food, and I said to myself "If I live I will invent a dinner pail in which a man may cook his food while he is at work," and *there* is the pail. [Pointing to a dinner pail on the table.] My attempt to-day to cook a saddle of mutton was a partial failure, although I did not fail so completely as I feared I had. The reason for that is that for some unknown cause a new oven does not cook as rapidly as an old one. I invited my whist club, with nine other gentlemen, to my house to take dinner on Saturday night, and cooked a saddle of mutton larger than the one I cooked to-day, and, although so large, I over-cooked it. Therefore I ran to the other extreme with this new oven and under-cooked this saddle of mutton. But it was not so bad, after all, because each of you had your slice of leg of mutton cooked in the same oven, and you did not find out the difference between that and the mutton cooked by Mr. Sherry.

Now, I am not a scientist. I am a doctor merely by courtesy of the State University of South Carolina. I have no pretence whatever to scientific knowledge; I have had no training of that sort. But in the course of my investigations and study of how to build a factory, I learned that a thick roof would keep out heat and would also keep in warmth. It would keep out cold and prevent the condensation of moisture on the inside, which is one of the weaknesses of the common thin roof. I learned that the thick wooden roof would keep in the warmth which was generated within, while it would also be a very slow burning roof. And I began to reason by analogy from the factory roof down to an oven, and I said: "If I could only build an oven of pine wood that would not burn in cooking, I *could catch my heat*." So I adopted the rule of "*first catch your hare;*" my rule is: "*first catch your heat*, and having put it into a box keep it there." As I could not use pine wood I thought I might try to use pine wood pulp. I found I could use wood pulp in a way which made it non-combustible or non-ignitable. It is one of the best non-conductors of heat in existence; not quite so much so as pine wood simple, but better than anything else of which I have any knowledge. By exposing it to a high heat you may gradually reduce it into fine ashes, but you cannot set it on fire with any degree of heat which is required to convert good food material into nutritious cooked food.

Then I began to study the effect of heat upon food, and I learned at once that it is not "the Lord who sends the meats and the Devil who sends the cooks," but it is the Lord who sends the meats and the Devil who sends the iron stoves. I found that an iron stove, through which the heat may abundantly radiate and cannot be kept where you want it to do your work, was an *infernal* machine. It cooked the cook a great deal more than it cooked the victuals. Moreover, I learned that our ignorance as to the right combustion of fuel was to be measured by the height of our chimneys, and that no kind of fuel that requires a strong draught in order to keep it in a state of ignition is fit to cook with, because, by the very measure of the draught required to keep hard coal in a state of ignition with which to do the cooking, you must—whether you will or no—over-heat your oven and convert your fats, instead of cooking them, into a most indigestible kind of oil. You will diffuse the odors of your meats throughout the household and you will destroy the fine flavor of the food. I therefore utterly condemn, as unfit to be used, any kind of iron stove that has a chimney to it or that is fed with anthracite coal. That is a very radical conclusion but, I think, a just one.

The next step was to find out how to do better. You will find that the successful cooks all *cook slowly at a moderate degree of heat.* You will find, perhaps, that the secret of French cooking is in the scarcity of fuel. The French have learned how to use a little fuel in the most effective manner, because of the fact that they are obliged to economize in its use, in their little bits of traps, over which, with a small amount of charcoal, they do a great deal of work. Now we have a better fuel than charcoal in kerosene oil, which can be completely consumed in a lamp with a glass chimney; and the latest invention, which I am about to apply to this pail, is a lamp that requires no glass chimney, nothing but a wind guide to promote perfect combustion.

I next learned that cooking at a high heat was almost always *bad* cooking; that the evil effect upon almost all kinds of food of a high heat is to throw off the volatile portions of the fats, and the fine but volatile juices in the form of smells. When you have thus dissociated the fats and destroyed their original integrity by this process of partial distillation, you have left in the food an oily and indigestible substance which passes through the digestive organs, causing indigestion, without being assimilated. It is the main cause of the ruling dyspepsia of the American people. In this pail and in that Aladdin oven you cannot get so high a heat, with the lamp that is adjusted to it, as either to dissociate the fat or to distill the juices of the vegetables; and therefore you can cook your meal within this room, without creating any objectionable smells, at the same time retaining all the nutrition in the food, by subjecting it only to such a heat as will convert it into an assimilatable form. That is the prime advantage of this method of cooking, which, while taking a longer time, does its work most effectually.

When I came here before, I came with Prof. Atwater, who has done such excellent work in connection with the experimental stations. But now, gentlemen, why should the experimental station stop at the nutrition of the soil and the beast, when the objective point of the nutrition of the soil and the nutrition of the beast is the nutrition of man?

On a recent visit to Washington, in addition to attempting to stem the tide of free silver coinage, I devoted a little time to this subject. I called upon the Commissioner of Agriculture and the Assisstant Commissioner, Prof. Willetts, who is the scientific man of the department, and upon Prof. Atwater. With the approval and through the intervention of those gentlemen it is possible that the appropriation for the continuance of the experiments at the Agricultural Experimental Stations may be enlarged so as to add to one or more of these experimental stations *a cooking laboratory*, in which the work of the right way of preparing the vegetable and animal foods shall be fully worked out in order to teach the common art of cooking for the mass of the people. Anything which you can do to promote that additional appropriation, which is now pending, will be work well directed. (Since the above remarks were made, action upon this appropriation has been deferred until the next session of Congress.)

A few words now, gentleman, as to what can be done. That Aladdin oven, so-called, is nothing but a paper box. It is made of wood pulp, of which the greater part of paper is now made. The wall is three-quarters of an inch thick, with a little buffer of asbestos and ground sponge interposed between the paper and the tin lining. We rely on the pulp as a non-conductor, not on the asbestos. Inside of that is the cooking box, made of sheet iron. The heat of that Rochester lamp passes through the hole in the bottom of the outside oven to the outside of the inner oven. It cannot escape, therefore it does its work. With that lamp and that sized oven you can produce a heat of 350°, then the radiation checks the further use of heat. With that heat you can cook slowly and thoroughly. You do not dissociate the fats or distill the juices. You have, therefore, no offensive smells, and your cooking is thoroughly done, if you give it sufficient time. My cook at home, who has adopted this method of cooking with the utmost interest, has learned that, by proper adjustments of the dishes upon the bottom of the oven, immediately over them she can do a great deal of quick work. She has found out that she can get our breakfasts quicker by the use of this oven than she can by being obliged to build the fire and getting ready to do the cooking in the range. The consequence is the range is out of commission. We use the range to heat the bath water and to boil the potatoes, but all the rest of the cooking is done in one oven with one lamp.

Now let us begin with the staff of life, the bread. You have had a taste of the bread. The rye biscuits have not been served. I should like to have the waiters serve around some of these rye biscuits, of which there are a few left. These are quickly cooked biscuits or "gems" for breakfast. They are made only of rye flour, water and baking powder, cooked upon the bottom of the oven over the lamp. I think you will find you have the taste of the rye more perfectly in these than in any other form of rye bread. What is the secret of bread making? When you deal with flour you are dealing mainly with carbonaceous material. All kinds of carbonaceous materials are non-conductors of heat. When you subject a loaf of dough, or a pan of dough, to a high heat in the ordinary oven you immediately cook the outside and begin to make a hard crust before the heat has penetrated to the center of the loaf. Then you take that loaf out, apparently well done, when in fact the heat has not reached the heart of it and the yeast plant in the center has not been killed. The yeast plant grows on inside of the hardened outer crust. You cannot eat the fresh bread because it ferments in your stomach, and it moulds quickly or turns sour, according to the weather; you have bad bread; whereas, when you apply a heat not exceeding 320° for a sufficiently long period you do not harden the crust, but you cook the loaf through to the heart and you have perfect bread. There were three kinds of bread brought here: the white bread, of which a loaf was sent around, the rye bread and the graham bread. I do not know which this is, but I think each is very good in its way; and each will keep for several days without becoming dry or mouldy.

There are 20 or more people in my employment at my office. I have established a kitchen on the middle floor of the fine building where we are, and if there were any offensive smells from it, all the tenants would at once notify us of the fact, but there has been no objection raised. That kitchen has been there two or three years, and all of my employes are furnished with an excellent mid-day meal each day, at a cost to themselves of about 20 cents. I have put it upon a commercial basis. I got them to agree that they would shorten the lunch hour from one hour to 40 minutes. That 20 minutes a day is worth more to me, as a business man, than the rent of the rooms and the salary of the cook. Therefore, I make money out of it, while the employes get an excellent, well-cooked lunch every day for 20 cents. It is all cooked in an office close by our own in the same building.

Now in that oven I have frequently put a four course dinner for eight people. I have frequently put the meats on the bottom shelf, the fish on the next shelf, two or three kinds of vegetables, including onions, on the next shelf, and the custard on the top shelf; cooking them all together, only putting them in according to the time required by each. I have taken out a perfect dinner of four courses, without the slightest taint having passed from one kind of food to the other. That proves that there is no distillation. Moreover, we cook such a dinner in the crockery dishes in which they were served—fine French china or common English china—without cracking the dishes or crazing the surface, as it is called, because the heat is not sufficient to crack them. The dinner is served hot on the table. There are no dirty metal pans and pots to be cleaned up. Those dishes can be immediately cleaned, without difficulty.

Under this method my wife does not feel disturbed when I propose to give a dinner—whether I have 10 or 80 people invited. I invited the whole of the Thursday Club, of 80 people, to my house one night, proposing to give them what would serve for a dinner. Of course, I could not seat 80 people, except in a perfunctory way; I seated them around in the dining room and library and drawing rooms and told them that it was an unconventional dinner. I began with 30 pounds of saddle of venison. There was venison, grouse, sausage, and baked apples, scalloped oysters, ham à la Sam Ward, baked lobster, etc., etc.; I have forgotten the rest, 120 pounds in all. I supposed we should have cold victuals for the rest of the week. But the next morning, when I inquired of the cook what there was left, she said there was very little; the company and the coachmen had eaten all up. The proof of the victuals was in the eating.

I went out to our cook, who is an every-day, excellent and intelligent Irish cook, and said: "Delia, I am going to have 80 men here for dinner. Do you want any help?" "No, sir," said she, "I would rather do it all myself." I, of course, procured some waiters to help serve the dinner; but that woman, with five lamps, cooked a very excessively hearty meal for 80 people and their coachmen. If any one of "The Farmers" knows any member of the Thursday Club of Boston, I wish he would ask whether or not that dinner was good. It did my heart good to see my Episcopal, Catholic and Unitarian friends among the clergy, and one or two other good preachers who were there, sit down and enjoy their victuals that night. "Them pious eats," as Caterer Smith said to a host who complained of a scanty supper, who had not told him the guests would be clergymen.

I have expended about $1,000 capital to get around to this oven. I have hardly yet perfected my workman's pail. In the few minutes still at my disposal let me tell you about the workman's pail. To-night you have tasted of one of the combinations of food which I have invented for this purpose. It was cooked in this pail, which is really also a bread pail. You can, in the evening, by the light of the lamp by which the house mother is sewing or reading, bake a pound and a half of bread in that pail. Having done that, you can then start your breakfast at night, by putting the meat stew into one box and some oatmeal into another, lighting a very small lamp when you go to bed, and letting it cook all night. You will find your breakfast all ready for you in the morning, as I have frequently done, or you can cook a day's meals all at once. We will assume we are going to cook a whole day's ration, having, to start with, the pound and a half of bread baked the night before. We will next assume that we want a meat stew, made of mutton flank, which can be bought at five or six cents a pound. We will make a nice Irish mutton stew in one box. We will then put a little fish chowder into a second, and a pudding or some oat meal into the third. Any of these may cook five hours. Some may be done in less time, but it does no harm to let them stay in the oven. Having charged these three boxes, we have three and one-half pounds of food of a nutritious quality. Add three and one-half pounds of food of a nutritious nature to one and one-half pounds of bread, and we have five pounds of food, which may be so made up on simple rules that it shall contain either the mechanical units of heat or the nutrients, the albuminoids or proteine, the starch and the fat, in the exact condition and proportion for the needs of man. Having put our three and one-half pounds in the three boxes, we put the cover on, light our lamp and go about our business; when we come back to the pail after five hours' time we find the food all cooked. It can not be burned or evaporated or spoiled, even if we are obliged to remain away longer than five hours. It will not be dried or spoiled, but the tough meat may be a little more tender than it otherwise would be.

To-night you had one pound of the neck or the shin of beef, which can be bought at five cents a pound, and which, when made tender by the long application of a low degree of heat, really contains more force than the tenderloin. You had a half-pound of suet, the greater part of which usually goes to the rendering pot—it is practically a waste product—and you had one pound of fine hominy (at home I use the coarsest I can get); you had t seasoned with savory herbs—not quite as much as I should have put in—and a certain amount of water. You had in that outlay an equivalent of four pounds of food at 12 cents; and you have had a taste of it.

On Sunday last, it being a stormy day, I staid at home. I had sent up to the house 13 pounds of food—cheap veal, cheap beef, cheap mutton hominy, corn meal, sausage and the like—at a cost of 70 cents for the lot of 13 pounds. I used three pails. I put it into various boxes, and at two o'clock I lit the lamps under each. To the 13 pounds of solids were added 7 pounds of water or skimmed milk, so that the total cost of everything used, including the seasoning, did not exceed 75 cents. I invited some friends in, and nine of us had our supper. My servants, five in number, had their supper. There were 14 altogether, who partook of 75 cents worth of food. Each of us had enough; each ate a hearty meal, and there was left over sufficient for four for the next day. We ate only four cents worth each.

That is what may be accomplished by taking my recipe for plain cooking. There is only one recipe for it, and that any one can readily learn, to wit: *take one part of gumption and one part of food; mix them together in the box, put that box in the oven and cook to taste.*

Last week I employed four different people—two people of high intelligence and two people of ordinary intelligence—to go around in the different parts of Boston and price all the cheaper varieties of food—meats and vegetables and grains—at retail. I will not attempt to give to you that list of prices. It covers the average prices of the neck, the shin, the suet, the corned beef, the beef liver and heart, salt pork, hominy, etc.; just what any one can buy at retail. I made an average of those prices. What can be done with them you saw by what has been done with the shin, suet and hominy this evening. You did not realize that you had as much meat and suet in what you tasted as you had of hominy. You did not realize that there was a great amount of fat—which gives heat to the human boiler, just what the working man requires. This fat was so absorbed in the hominy that there was no greasy tang to it. It was in the most nutritious condition. I suppose that compound of which you took a taste contained more *potential energy* in proportion to the price than any other compound that could possibly be put together. You had the shin of the beef, you had the fat, and you had the Indian corn; nitrogen, starch and fat. You had a true proportion of nutrients for a hard worker; you had a fair proportion of nitrogen; you had a large amount of starch; you had an extra amount of fat; and yet I am satisfied you did not, any of you, realize that you were eating a very large amount of fatty food. That was the ration for a hard-working man.

Now, when that pail is finally completed it will be of a smaller size. The little wonder, as I call it, is eight inches in depth and it has two boxes. When the workman goes to his work he will carry this along, and when he gets to his work he will light his lamp, and at the end of five hours he will have his hot dinner, instead of cold victuals. I have tried this myself. It is only a month old. It is yet a baby. I keep my lamp in my office and I carry my pail to my house. I charge my pail when I leave my house, or I buy my victuals on the way, at a provision shop, where a man has agreed only to recognize me as a very poor man and to charge me honest poor man's prices (which are pretty high). In five minutes after I reach the office I can prepare my mid-day meal. Then I put it beside my desk, and at noon time I have my meal.

I have averaged up all these prices and have made up a dietary for 30 days: 22 pounds of flour, 20 pounds of meat, 2 pounds of fat or suet, 6 pounds of fish, 30 pounds of grain, 20 pounds of vegetables, 2 pounds of sugar, 2 pounds of butter. I did that by averages so as to reach a 30 day ration at 16 cents.

That is for the hardest working man, who can absolutely consume five pounds a day. There are very few who can do it. At that average and at those prices any intelligent workman who needs the utmost quantity that he can possibly assimilate can buy it for 16 cents a day, at retail prices in Boston. For the working man at average work the price goes down to 14 cents a day. The working woman, who leaves her pail doing its work in her room while she goes to her work and comes back to get her mid-day meal, can add the necessary tea and coffee and still come within 14 cents a day, (which is a dollar a week) and yet have all the absolute nutrition required. Having established this ration in an empirical way as to quantities and prices, I then reduced the whole ration to nutrients and I then reduced the nutrients to mechanical equivalents of heat. Strange to say, I struck it the first time. I have in that ration the right amount of nitrogen, starch and fat at the standard of nutrition of the workman at the hardest work; far above the standard of the German soldier with his scientific ration on his forced march to Sedan; higher than the general peace ration for the German soldier. There is in 12 cents worth all that any average woman can eat.

I undertake, therefore, to say that the subsistence of man or woman is solved; that the average man or woman can live in that pail without any kitchen, cooking the food in each little box from which it may be served; also baking bread in that pail, at a dollar a week. I think that is something worth accomplishing. As to variety, that list can be varied on each of the 30 days, so that every day's bill of fare will be different from the one previous.

Few can afford the time and attention required to accomplish subsistence at one dollar a week. Most people had better be a little careless; spend a dollar and a half, or two dollars, and on that one may live on the better cuts of meat, good butter and the best of bread.

That, gentlemen, is as far as I have gone in the science of nutrition; as my time is more than up I will now leave the subject with you.

Mr. Cannon: Gentlemen: I think that the "New York Farmers" must be entirely satisfied with the treatment of food and the exposition that has been made to us with such wonderful ability this evening. We must all be convinced that we are the most wasteful people upon the face of the earth. The great value of this lesson is to bring it down to the laboring man. But perhaps we have fairly exhausted the subject of fodder crops and the preparation of foods. We are honored this evening by the presence of a gentleman who knows very little about fodder crops, but who may be recognized as one of the greatest foragers this country has ever produced; a man who has reaped where he has not sown and gathered where he has not strewn. Few men in this country ever made so broad a swath, for he swept everything away that came out of the earth and gobbled about everything that had four feet upon the top of the earth, culminating his success by the capture of that arch traitor, Jefferson Davis. Gentlemen, I have the honor of presenting to you, Major-General Wilson.

Mr. Wilson: Mr. Chairman and Farmers: I am taken completely by surprise. A distinguished senator of the United States, now gone to his fathers, famed for his capacity to make impromptu speeches, said that nobody knew how he laid awake nights thinking what he should say in an impromptu manner the next day. The dear Colonel has not given me even the privilege of lying awake nights to think about an impromptu speech that I might make this evening.

It was my good fortune to sweep up pretty nearly all the forage, all the fodder, in the path that I travelled. I struck it rich frequently, and everything there was worth taking, in the shape of food products, we took. With seventeen or eighteen thousand horses, carrying no provisions with them, it took a County a day to keep them going. Therefore, motion was the law of our existence. It was motion or starvation. We used to study just where we would strike it best, and I want to pause just a moment to say, in support of the statement made by the distinguished gentleman from Kentucky, that Indian corn growing in the field is the best possible fodder for horses. Early in the Spring time, when they are run down and their coats are shaggy and their ribs are visible, a week on good corn fields will straighten them out as nothing else in the world will. I know, because I have seen it tried.

As I had occasion to say, we looked for good places to find forage, and the one regret that I now have in looking back upon that time is that we did not strike the plantations of the "New York Farmers." I am perfectly satisfied it would have been a first-class thing for us—and a bitter experience for them.

Only a few days ago I had a letter from a lady in Rapides Parish, Louisiana. She was the wife of a Colonel Matthews, living, when I first made her acquaintance, in the black lands or prairies of that most bountiful region. Her husband's plantation lined both banks of a river. At her house I had an interview with one Forrest, somewhat distinguished also as a forager. Little did I dream what the results of that meeting were to be, so far as Colonel and Mrs. Matthews were concerned. Colonel Matthews was at that time a loyal citizen of Alabama, a distinguished man, respected and honored by his neighbors throughout the State. He had plantation after plantation, and negroes by the hundred. It so happened, however, that this river divided my forces from those of Gen. Forrest's. He took all there was on the west side of the river and we took all there was on the east side. The result was that we took from that family what constitute the superfluities of life. Her husband shortly afterwards died, her negroes were set free, her plantations were sold to pay the factors; and to-day she is living in indigence in the State of Louisiana and asking simply that a government which is just and honest shall return to her compensation for what we took from her. That will give you some idea of what foraging comes to when it is pursued industriously.

I do not propose to entertain or to detain you with experiences of that sort. The greatest forager that this world has ever produced, (unless it be Wallenstein, who knew no restraint, moral, religious or intellectual), lies to-night stark and cold and stiff in death's embrace. That man was a forager. He swept, with his thousands, his tens of thousands, a broad path through the South, where everything that was eatable was swept away and used for the support of his magnificent army.

Gentlemen, that man is worthy of all admiration. It is no time for us to make merriment over the deeds of the past. It is no time for us to tell stories that throw a pleasing light upon those days. But I recall something of the character of that man, of General Sherman, upon an occasion that was very interesting to me and which may be interesting to you.

I reported to him on the 5th day of October, 1864, to take command of his foragers. After disposing of the business upon that occasion, we sat by his camp fire at the little village of Galesville, in the northeastern corner of Alabama, whither, with 70,000 men, he had followed Hood in his march towards central Tennessee. The officers of his staff had departed, his army was sleeping in the midst of the forest about him; no noise disturbed the scene except the tramp of the sentinel in front of his tent; the camp-fire, burned almost down, fitfully blazed up in his face—that face which was marked with all the indications of a great mind—when he suddenly looked up and said: "Wilson, I'm a much smarter man than Grant. I know a great deal more than he knows about war and about history and about law and about everything. I tell you where he beats me and where he beats the world. He don't care for what he can't see the enemy doing, and it scares me terribly!"

Now, I have told that anecdote merely for the purpose of illustrating the fact that Gen. Sherman knew himself better than any other man knew him. And, furthermore, he knew his great chief as few other men ever thought of knowing him. The one was phlegmatic, was quiet, was undemonstrative: he did not care for what he could not see the enemy doing beyond his sight. He gave the daily problems of his life the best thought he could, upon the best information he could get, and then he went to sleep. The other, nervous, sanguine, excitable, did the same, except that he did not go to sleep. What he could not see the enemy doing, what the enemy was doing beyond his sight, aroused in him all the apprehension of his nature, and justly he said "it scared him terribly." It was a profound delineation of the difference between two of the most remarkable characters this country has produced. And I think that Gen. Sherman, in making that remark, showed just what I said awhile ago, that he perfectly understood himself and perfectly understood Gen. Grant.

Gentlemen, I will not detain you longer.

Mr. Cannon: It seems to me, gentlemen, we have not entirely exhausted this subject of forage crops and foraging. There is an element among the "New York Farmers" that seems to be equal to a dissection of all that science and experience have ever determined, and the analytical minds of the "New York Farmers" seem to penetrate and expose not only all the truth but also all the weakness of that which we have heard. We are favored this evening by having two representative farmers, two men who thoroughly comprehend the niceties of economic farming. Perhaps the gentleman from Massachusetts is the most fertile of any gentleman we have among us in his comprehension of those economies. I call upon Mr. Choate.

Mr. Choate: "Farmers:" It has been my habit to address you from a carefully prepared manuscript, but, with a view to condensing the great thoughts I have to utter, I have concluded, to-night, to trust to extemporaneous and spontaneous speech. I have listened very faithfully to what our learned experts have delivered for our instruction to-night, and I must say that we have never been more richly entertained and instructed. There is only one criticism to be passed upon Col. Hardin's very valuable address, one fly in his amber, and that was where he undertook to say so much about trusts. When he spoke of not putting too much *trust* in your work, I could not avoid studying the countenance of "Farmer" Havemeyer. There was doubt and dismay and contradiction displayed upon his countenance as the Colonel proceeded. He knows a great deal better than the orator of the evening that it is well to put a great deal of trust in your work. Take the mere concrete example of sugar! How wise it is to put a great deal of *trust* in your sugar, or, at any rate, to put a great deal, if not all, your sugar in a *trust*.

Mr. President: We all enjoy these Farmer's dinners, as we do our farmer's lives. There is nothing, I think, that tends so much to prolong the life of the New York Farmers as this recreation that we take around this table during the Winter, and the hard labor we expend upon our farms in the Summer. Why, my nearest neighbor in the Valley of Stockbridge died the other day at the age of 109. My nearest neighbor above me on the hill has already reached the age of 86 years, and the other day he celebrated his 86th birthday, in company with his three distinguished brothers. I met him on the avenue as he was coming down from the feast and said: "Mr. Field, how in the world do you do it? How is it that at 86 you are in such splendid condition?" He raised his hands and his eyes to heaven, as he gave me the emphatic: "By being always good."

I sometimes wonder how we find time to devote to the tillage of our farms. Take Farmer Depew, for instance. How in the world does he cultivate his beets and his carrots when he spends the whole of every Summer in Europe, and all the winter in looking after these flitting visions of the Presidency and the Governorship. I had a striking instance the other night of how his farm is neglected. A great deal of it, I have no doubt, is very well attended to, but he does not take proper care of his trees. They fall in the night when he least expects it. I was going up in the midnight train on the Central Railroad. We were on the Hudson River branch and had just got past Peekskill when the train came bumb into a tree that had fallen across the track, right on the confines of Farmer Depew's farm. In the next section to me were two men. Of course, we all woke up with a sudden start, and I overheard the conversation in the next section. "Jim," said the man in the lower berth, "did you feel that?" "Yes," said Jim, "I did feel it; and heavens! that is the Central Railroad all over. That is just the road all the time; no head and no tail; nothing but politics and after-dinner speeches." Now, that is all the better story for being literally true.

Then I have had another experience in connection with another of our members, Farmer Appleton. I was very sorry I was not here at the last meeting, to hear him describe that celebrated cow of his, that has made more butter in 365 days than any other cow that ever lived. I had the good fortune to enjoy his hospitality at Ipswich about two years ago. I went down to his farm and spent two or three days there. By the way, he was not half the man then that he soon after became and has ever since been. When we arrived, the first afternoon, as soon as we had had dinner, he said: "Well, you must come out and see the cow." So we went out and saw the magnificent cow, and he gave me her pedigree. He described to me the tonnage and poundage of that cow from beginning to end. Eleven thousand pounds of butter, I believe it was, since the first day of January. Of course I was lost in admiration and surprise. The next morning after breakfast—I could not have too much of that cow—he said: "Mr Choate, you must come out and see that cow again." So we went out and looked at the cow again; and she was no longer on the lawn, basking in the rays of the sun. She was wrapped up in five or six blankets. Her tail was drooping between her legs, her legs themselves had each acquired an additional hinge, her dewlap was hanging to the ground. Said I, "Mr. Appleton, what is the matter with the cow?" "Well," said he,—like Mr. Atkinson's saddle of mutton—"she has overdone the business." He had passed the Force Bill with a good deal too much eagerness and enthusiasm, and it had re-acted and proved a perfect boomerang. I hope he will tell us before the evening closes how he created a re-action in that cow and brought her up so that she, after all, before the end of the year did beat all the records that ever before existed among cows.

I ought to say a word, before I sit down, about Mr. Atkinson's very instructive address. We all ought to take heart from that. There is one lesson we "Farmers" of the New York Club ought to learn, and I think we will, and that is our annual dues are altogether too high. Why should we pay $30 or $40 apiece for three dinners. It is not necessary. I refrain from allusion to the viands spread before us to-night by the steward, and confine my remarks to what Mr. Atkinson distributed. I find I got more potential energy in proportion to the price than I ever before received. No, we ought not to levy any such contributions upon ourselves. Eight cents apiece for each meal; twenty-four cents apiece each day. Eight dollars and forty cents ought to provide all the support, all the nourishment, all the entertainment we can require throughout the winter, and we would come out, at the end, better men, better farmers, wiser economists, than we have ever thought of being.

Mr. Cannon: Farmers: I do not know that we can term exhausted the economies of agriculture, for there is one farm and one farmer we fall back upon as a resource and a finality. That farm always exhibits the largest economies from the fact that it is an ancestral farm; a farm that has been in the family almost since the discovery of America. It is scarcely necessary to suggest that that farm is not very far from New York. The ancestral farm is at Peekskill, and I now have the pleasure of presenting the distinguished inheritor of it, Mr. Depew.

Mr. Depew: Gentlemen Farmers: It was because of the length of time that farm has been in one family that that tree fell across the track.

The remarks made about General Sherman have called up some personal reminiscences. I saw a great deal of General Sherman. At the time of the delivery of the oration before the Army of the Potomac four years ago I was from ten until six o'clock riding about with the General. You know he was a most uneasy man, never satisfied, never at rest. It was a peculiarity of his that he could not keep still. He said to me at 10 o'clock in the morning: "Depew, I would like to see this Spouting Spring." It took only 15 minutes to ride there. Then he said: "Where else can we go?" We concluded to drive over to the Lake, where we were served with Moon's Saratoga potatoes by a negro waiter, who had been a contraband captured by "Bummers" "When we were Marching through Georgia." The old gentleman was interested in the incident. From Moon's we drove over to Judge Hilton's, and from there "all over," and finally reached the hotel at six o'clock. So that from ten to six, with these few interruptions, we were in this carriage, and the General was talking continuously about his experiences. I would have given much if we had had a stenographer along to have reported these experiences as he gave them, because, in addition to the incidents personal to himself during the war, there were side lights thrown in of the events themselves which would have been of incalculable value in an historical sense.

I recollect some of the incidents. He said that in one of the battles in Georgia he found the fight was going against his forces, and he, himself, went to the front. Of course the appearance of the General rallied the stragglers, gave renewed enthusiasm to the veterans, and the charge they made dispersed the enemy, he himself riding, in the heat of battle, into the enemy's camp—for it was an assault upon the enemy's camp—where he came upon a Confederate officer standing with uplifted knife, over a soldier upon a barrel. He shouted "Stop. I will kill you." He rode up—they still standing in the same attitude—and discovered that a Confederate surgeon had been about to perform an operation for the extraction of a ball from the body of a wounded Confederate soldier, who had been placed upon a barrel, when the concussion from a passing cannon ball had killed them both, leaving them, like statues, in the positions they occupied at the instant the ball passed by, the soldier upon the barrel, the surgeon with uplifted knife.

He related another incident which has not yet appeared in print, but which I consider an important contribution to history. He said that he reached Atlanta, against all the views of General Grant, all the protests of the War Department and all the ideas of Mr. Lincoln; and when there the War Department, General Grant and Mr. Lincoln did not exactly know what to do with him. But he was perfectly clear in his own mind that if he could swing across the country through Georgia to the sea he would destroy the resources that sustained the rebel army, and in that way deprive the armies of General Lee and General Johnson of the food upon which they relied. He said that General Grant's Chief-of-Staff was not friendly to him personally, and had no belief in his capacity as a general, and that he made General Grant believe that he, General Sherman, was visionary, and that General Grant impressed the same belief upon Mr. Lincoln. He was constantly asking "Give me liberty to go to the sea and I will go." He said: "Finally General Grant said to Mr. Lincoln, 'I don't know but you may as well let Sherman have his way,' and Mr. Lincoln sent a telegram to me substantially to this effect: 'Do what you think is best.'" He said the instant he received that message he directed a staff officer to destroy the wires for fifty miles around. Then he swung loose and started on that famous "March to the Sea." He never heard anything about the cutting of the wires or what it resulted in until he read Grant's book after Grant's death; and there Grant said that, having suggested to Mr. Lincoln that General Sherman had better be allowed to have his own way, and Mr. Lincoln having given that permission, he had himself become doubtful about General Sherman's movements and had sent General Rawlins and this Chief-of-Staff, who was hostile to General Sherman, to Washington for the purpose of countermanding the order, but that Rawlins found that the rebels had cut the wires.

He told me another story. When he came to Savannah one of the leading citizens came out to him and said: "General Sherman, I have a house full of priceless pictures. They are heirlooms." General Sherman said: "They are as safe as if they were in New York." "I have family plate." "It is safe; it shall not be touched. I will put a guard over your house." "I have madeira, the rarest, the oldest, the best there is in the whole country. It is worth, at prices before the war, $40,000, and it is buried in my back yard." "It is confiscated for the hospital." And General Sherman said he instantly ordered a staff officer to take a wagon and get that madeira and bring it up to camp. As soon as it came there he distributed it among the healthy soldiers, and a soldier would give a bottle of that priceless madeira for a gill of common whiskey.

He told me one thing more. He said he came to the cross-roads of the railway and the highway by which alone General Lee and his army could escape to the South and become guerrillas in the mountains of Georgia and Tennessee, and then he communicated with Mr. Lincoln and said: "I can sit here and capture Lee and his army, or I can move on and join Grant and crush Lee and his army;" and Mr. Lincoln replied: "Do what will shed the least blood."

Mr. Cannon: I have had the satisfaction of proposing for membership a farmer bred upon the farm, who worked upon the farm, in fact, a man who has been distinguished by the products of his farm; and who, not entirely satisfied with his successes in the agricultural department, aspires, with an ambitious nature, to great excellence in one of the most exalted of the professions. As he is a candidate, to be balloted for at our next election, I am inclined to the opinion that he should exhibit his ability to be one of our fraternity. I therefore call upon Mr. Beaman.

Mr. Beaman: Mr. President and Farmers—This may be fair, I have no doubt it is; but, as you know, I belong to a firm of farmers, and it takes a good lawyer to make a poor farmer—and I am a good farmer. I am a better farmer than Mr. Evarts, a better farmer than Mr. Choate; and if men are to be elected to membership of your association because they have practiced what your constitution talks about, the economies of farming, then elect me. Mr. Choate has eaten mushrooms, and thought they were a part of Mr. Atkinson's dinner. I might tell you what I think of Mr. Atkinson's dinner, but I am simply talking of farming. I am a real farmer. I do not make so much butter as Mr. Appleton does, but my partner Mr. Choate makes more bread and butter than most farmers. As a matter of fact, he makes butter enough for all his partners. All I do is to make bread.

I have been delighted, Farmer Harden, to hear you talk to-night about silos. Mr. Evarts owns a farm in Vermont on one side of the Connecticut River. It happened that I was there at a wedding and afterwards I undertook to buy some land; but there was no land for sale on the Vermont side of the river, so I bought land on the other side, in New Hampshire; and there I am, a farmer, and Mr. Evarts has been a farmer on the other side for thirty or more years. About two years ago he decided to abandon the planting of corn. He said "I will not plant corn. When it comes to husking time it takes so many hands that I can't get my corn husked." And so he gave orders to discontinue raising corn, and for the last two years there has been no corn planted on his farm. As you pass up on his side of the river you see beautiful meadows and on my side you see corn fields and red buildings. That is "Blow-me-down farm." Lawyer farmers like Mr. Choate, who raise nothing but flowers and butter-cups, really know but little about corn and food products. He may live long and do as much good as David Dudley Field, but he is no farmer. How he ever got in among you I do not know.

I built a silo last year, and Sunday before last I took a drive with Mr. Evarts in Washington, and during the drive we talked about farming, and he said "Beaman, how did the silo work?" I had been up to my farm the week before; and I replied: "My farmer says ensilage makes the best food he has for the cattle and I am going to put in another silo next year." "Well," said Mr. Evarts, "I think I will try it." And so, gentlemen, if you will take a run up the Connecticut Valley next Summer I have no doubt but that you will see corn fields in the meadows on each side of the river; and that will show just what Mr. Harden says, that the experience which comes to farmers quickly comes to lawyers slowly.

It seems to me that this Society, (to a membership in which I have been nominated and to which I hope to be elected,) has too much of the ordinary dinner talk that we hear at other dinners and too little of what farmers really need. Mr. Choate, for instance, comes here and tells the same things that he told me two hours ago down town. Farmer Depew tells the same story that he tells at the Harvard Club dinner. I do not want to suggest that your dinner has not been perfect, but I did want to hear more about food products.

While listening to the story of Gen. Wilson I was reminded of Gen. Sherman. The last time I met him was at a dinner at Judge Dillons, where I sat beside him. He told stories about fodder. He told me, what you perhaps have heard him tell, of his interview with Mr. Lincoln after he had returned from his march through Georgia, when he had cut his wide swath to the sea, living on the land. Mr. Lincoln said to him, "Sherman, you don't look starved. How were the turkeys?" "All right" said Sherman. "And how were the hams?" "They were all right, too," said Sherman. Last Sunday night I saw Gen. Sherman dead and yet alive. His whole appearance was very life-like, as we have known him. And what did that great General have in common with Lincoln? As I have heard you, General Wilson, say, he had this in common with Lincoln. He had not only heart and will and mind, but he had this very quality of humor and wit that ran through your story of Lincoln and which endeared Lincoln and Sherman to us all. Remember, you that knew Gen. Sherman best, whether anything he told, however vigorously he told it, did not wind up with one of those beams of humor; perhaps not exactly as Lincoln would have told it, but still with true wit. Lincoln and Sherman were the incarnation of the power and strength and wit that carried our Country through war to peace.

This, then, is what I commend to you farmers—not simply the food products that fill the stomach, but those which, filling stomach and mind, fill also the heart with joy and laughter.

Gentlemen: At your next Farmer's dinner, or at some other dinner, you will discuss other subjects; but you cannot discuss a subject that brings to you, or to those who are your guests, more of interest than that which concerns the food products for our animals and so for ourselves. I practice law to earn money—to buy manure to put on my land to raise crops to feed cows to make manure to put on the land to raise crops to feed cows to make manure to put on the land to raise crops to feed cows. That is what I am doing and that I suppose is also your farmer's life, and the only reason I am not so good a farmer as most of you is because I cannot earn so much money to buy manure as you can.

Gentlemen: I have been very glad to be with you to-night and hope I may again be with you.

A vote of thanks to the guests of the evening, who had entertained and instructed the Club, was moved and carried; after which "The Farmers" adjourned to Tuesday, December 22d, 1891.

# INDEX.

| TOPIC. | DATE. |
|---|---|
| How is the Eastern Farmer to compete with the Western Farmer? | December, 1882 |
| Sorghum, | January, 1883 |
| Butter, | February, 1883 |
| The Great Cattle Ranges of the Far West, | March, 1883 |
| Tree-Culture and Forestry, | December, 1883 |
| Meadow and Pasture Grasses, | January, 1884 |
| Horse Raising in the Eastern States, | December, 1884 |
| Sheep and Sheep Husbandry, | January, 1885 |
| Grape-Culture and American Wines, | February, 1885 |
| Fish-Culture, | March, 1885 |
| Preservation of Game, | December, 1885 |
| Feeding of Cattle, | January, 1886 |
| Poultry, | February, 1886 |
| Subsoil Drainage, | December, 1886 |
| Fertilizers, | January, 1887 |
| Rotation of Crops, | February, 1887 |
| Injurious Insects, | March, 1887 |
| Fruits such as Farmers grow and their Cultivation, | December, 1887 |
| The Feeding of Cattle, | January, 1888 |
| The Feeding and Breeding of Swine, | February, 1888 |
| Contagious Diseases of our Domestic Animals, | December, 1888 |
| Farm Structures and Fences, | January, 1889 |
| The Pleasures and Pains of Farming, | February, 1889 |
| Country Roads, their Construction, Improvement and Maintenance, | December, 1889 |
| The American Trotting Horse, | January, 1890 |
| Landscape Gardening, | February, 1890 |
| Reclamation of Waste Land, | December, 1890 |
| The Feeding of Cattle and its Relation to the Cost and Value of Production, | January, 1891 |
| Fodder Crops, | February, 1891 |

UNIVERSITY OF ILLINOIS-URBANA
3 0112 124674091